VIDEO: US WEST LOOKS FOR CUSTOMERS **TECH FOCUS:** FRAME RELAY PAYING OFF

America's Network

OCTOBER 1, 1995 TECHNOLOGY FOR THE NEW PUBLIC NETWORK CAN $5.95 • US $4.95

DIGITAL SET-TOPS? NOT THIS CENTURY

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FROM THE

EDITORS

BEYOND PLATFORMS

This issue's cover story on the delay of the digital set-top—and therefore on the health of the analog services industry—tells an interesting story of how competition is shaping the development of high-technology products in the public network.

The piece, by *America's Network* managing editor Eric Krapf, points out that service providers are demanding advanced analog set-top features from manufacturers because the current level of competition in video services already is running high. "We're doing it not primarily as a revenue tool but as a competitive tool," says one executive of his company's decision to reinvest in analog.

In short, video providers cannot afford to wait for various segments of the network to go digital. Instead, they are driving enhancements to the current underlying technology. In this case, that means adding features that would permit offering virtual channels and localized services. In response, vendors are trying to "future-proof" their boxes.

The moral of the story: competition has providers itching to add value. And the fastest way to do that is to add new features to the existing technology base. Infrastructure evolves too slowly for today's bottom line-directed service providers.

Today's service providers should heed the story of what's happening in the set-top market when considering how to respond to the still-increasing demand for Internet content, access, applications and services. The client-server based Internet is the current platform of choice for offering interactive services. Its popularity and usefulness show no sign of abating: features and enhancements are being added daily.

Today's service providers seem to be spending too much time focused on which infrastructure or platform will be right for the services they believe customers might want. Instead, they should look at where the demand is now and on which platform. Then they should start developing services on that platform. The infrastructure debate should come last.

PAUL McCLOSKEY EDITOR

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OBSERVATION DECK

COMPETITION, REVENUE SCARCITY SIGNAL WIRELESS ICE AGE

Carl R. Aron, National Director-Wireless Consulting Practice, A.T. Kearney & EDS Co.

The wireless world is about to undergo a substantial change that will undermine common beliefs, upset widely-held expectations and cause substantial disappointment. The nature of that change perhaps is communicated best through use of a metaphor—a coming Ice Age.

Four fundamental forces determine whether inhabitants of the world of mobile telephony prosper or starve to extinction: the nature and number of inhabitants (competitors); the adequacy of the food supply (revenue); the skill level (operational effectiveness) of the population; and the availability of stores of food (capital).

From 1983 to 1995, the number of competitors was small, revenue was more than adequate, operational effectiveness was not critical to survival and capital was plentiful. That period was the Golden Age of wireless.

Conditions for prosperity in the Golden Age were not created by inhabitants; the cellular duopoly was a gift from the FCC, and revenue grew without intense competition. Success and wealth were determined by market forces, not skills. Indeed, lack of skill was not severely punished in the Golden Age because capital was available to the skilled and unskilled alike.

RADICAL CHANGE

The coming Wireless Ice Age will witness radical changes in the fundamental forces that shape the wireless world. The number of competitors will increase significantly and revenue will, in time, stop growing. The importance of skill will increase a hundredfold, and the availability of capital will decrease.

Revenue growth will slow to the point where it no longer can support all competitors. Decreasing prices will contribute to revenue inadequacy, and this will fuel the increase of competitive intensity. A downward price spiral may develop.

Revenue scarcity will cause some, perhaps many, inhabitants of the Wireless Ice Age to starve. In many wireless markets, the survival of a competitor will depend on its ability to secure a disproportionate market share. Under conditions of revenue inadequacy, the survival of one competitor requires the extinction of another.

In the face of revenue inadequacy and intense competition, operational effectiveness will be a critical success factor to a degree unprecedented in the Golden Age. Competitive skills not only will increase the likelihood of survival on the part of one competitor, but they also increase likelihood of extinction on the part of another.

Those who have provided capital to network operators will place greater emphasis on results, paying closer attention to the operations of the mobile service providers in which they invest. As capital providers become weary of prolonged price wars and the consequent negative cash flows, operators will find capital much less available.

To survive, inhabitants must fight for more than their share of revenue. But both competitors can't survive if they fight in the same manner; they must devise a strategy others cannot use or cannot use as well. And that strategy must be better executed to offer the prospect of survival.

Strategies must integrate sources of competitive advantage to which providers have superior access. In wireless telephony, these sources include management talent and vision, size, functionality, time, physical resources, information resources, distribution resources, brand recognition, incumbency and scope of offering.

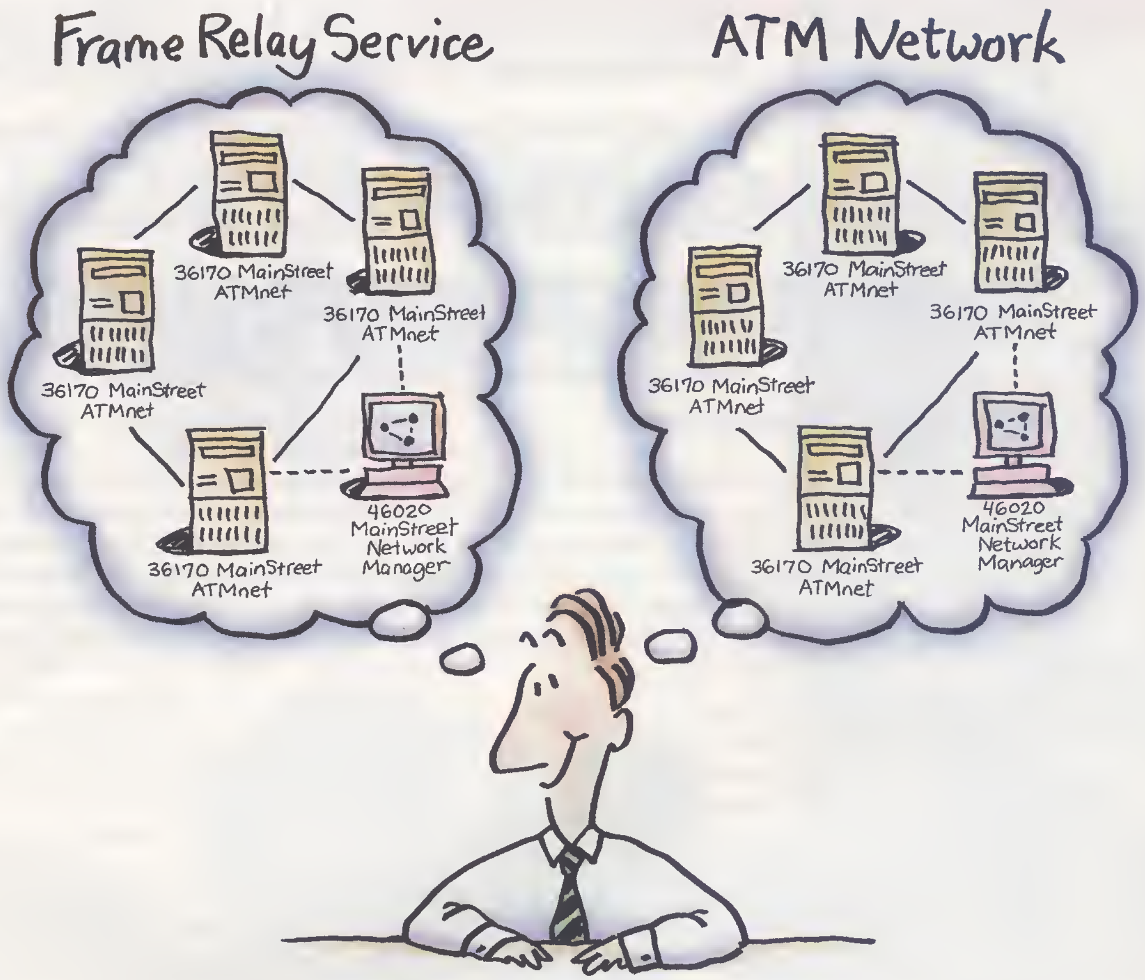
The process of integration appears to indicate four centers of gravity around which sources can be focused: lowest-cost service, of acceptable quality; focused service superiority, including product innovation; horizontal service integration, meaning bundling services and offering a broad range of communications services; and superior customer relationship, thereby reducing churn.

While selecting an effective competitive strategy will help prepare a competitor to meet the challenges of the Ice Age, that selection alone will not ensure success. Ice Age inhabitants, like their distant ancestors, must develop and use tools to eke out adequate sustenance under hostile conditions. These tools will maximize skills and provide advantage in the competition for revenue. Distribution management, database marketing, information systems planning and organization alignment will be some of the more important tools. Effective use of such tools will provide the distinction between the survivors of the Wireless Ice Age and those who become extinct. ■

Comments excerpted from "An Ice Age Is Coming to the Wireless World," published by A.T. Kearney & EDS Co. (formerly EDS Management Consulting Services prior to the acquisition of A.T. Kearney).

Keys to Success

Strategies must integrate sources of competitive advantage. These include management talent and vision, size, functionality, time, physical resources, information resources, distribution resources, brand recognition, incumbency and scope of offering.



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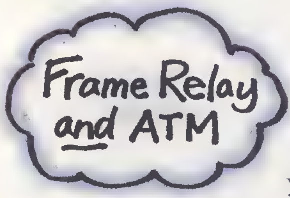

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TECHNOLOGY

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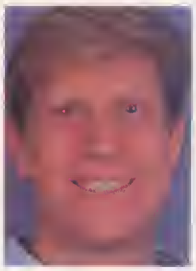

MESSAGE IS CLEAR: SS7 IS PROVIDERS' GOOD LUCK CHARM

Mark Dziatkiewicz, Technology Editor

Come on, lucky seven! While there's little similarity to a crapshoot roll, Signaling System 7 (SS7) provides network operators a prodigious payback. Without it, many new services and networks may never have happened.

SS7 is best described as a digital signaling standard and was developed by the ITU-TS (formerly CCITT). It stems from Common Channel Interoffice Signaling System 6 (SS6), which used a separate facility for sending signaling information to distant telephone offices. This separate facility—hence the term SS7 "network"—removes network messaging and signaling from transmission or "talk" paths.

All early signaling methods used the same circuit for signaling and voice. Circuits were "busy" from end to end from the moment callers started dialing until they went back "on-hook." Talk paths were established through the network without knowing whether the called party was available. On top of the inefficiency, telephone companies had a hard time keeping up with growing demand.

"There's a great many call attempts that happen before a call goes through. Traffic engineers in operating companies realized if the volume of traffic grew, then the number of attempts to make a call would also increase," explains Jim Gagne, director-marketing for EBS. Since each call attempt—completed or busy—used valuable network resources, "they realized there had to be another way to look ahead and determine what to do with the call."

Can't Live Without It

At one time, everything was done by Bell Labs and you waited. Today, SS7 allows the provider to come in with a service that the competition may not have. Enhanced services that have grown off of it could never have been done in the old environment.

SEPARATE SIGNALING NETWORK

The answer: a separate signaling network. Instead of using voice trunks for signaling, talk paths are established only after an end-to-end connection is made and verified. With SS7, all supplementary busy tones, announcements and recordings are provided by local rather than distant offices, leaving voice trunks unconnected.

Since SS7 introduces considerable network intelligence, it wasn't possible until network switches got smarter. "Once the 1AESS was introduced, it drove the network to become more enhanced," says Walt Brown, EBS senior product manager-wireless and billing. "And as switches got more powerful, it drove the network to become more enhanced and evolve to more powerful software solutions."

These software solutions are derived from an SS7 network architecture incorporating three distinct network signaling points: Service Switching Points (SSPs), Signal Transfer Points (STPs) and Service Control Points (SCPs). Fifty-six kbps data links connect signaling points in the U.S.'s SS7 network, although other rates are used internationally.

SSPs correspond to local exchange offices. "It's where you get your dialtone," says Brown. The SSP can be the switch or adjunct to the switch, creating messaging or signaling packets for transmission.

STPs "switch" messages through the network to appropriate destinations. "Usually companies providing telecom services put in two STPs, geographically diverse and redundant," Brown continues. "They do that in case one goes down. They're engineered to support no more than 50% of the load so if one goes south, the other can pick up the traffic."

The SCP "determines what the features and functionality of the call are. It provides the intelligence of the number," adds Gagne. "If that telephone has special features, the SCP provides that to the STP and aids in completing or routing the call."

For example, when subscribers dial an 800 number, an SSP queries an SCP through an SS7 message, requesting the 800 number's corresponding routing and billing information. Other examples include special time-of-day routings. "Based on the time of day, your calls may be handled out of Atlanta and then change to St. Louis," explains Brown. "The SCP determines it should be sent to St. Louis because of time-of-day information in the database."

The SS7 network continues to gain importance. "Switches are designed to do a number of things, but in order to do enhanced services, you have to have SS7," claims Gagne. "At one time, everything was done by Bell Labs and you waited. Today, SS7 allows the provider to come in with a service that the competition may not have. Enhanced services that have grown off of it could never have been done in the old environment."

Hardly a crapshoot, SS7's an intelligent network necessity. If you don't have access to the network, you're not going to be a competitor. ■

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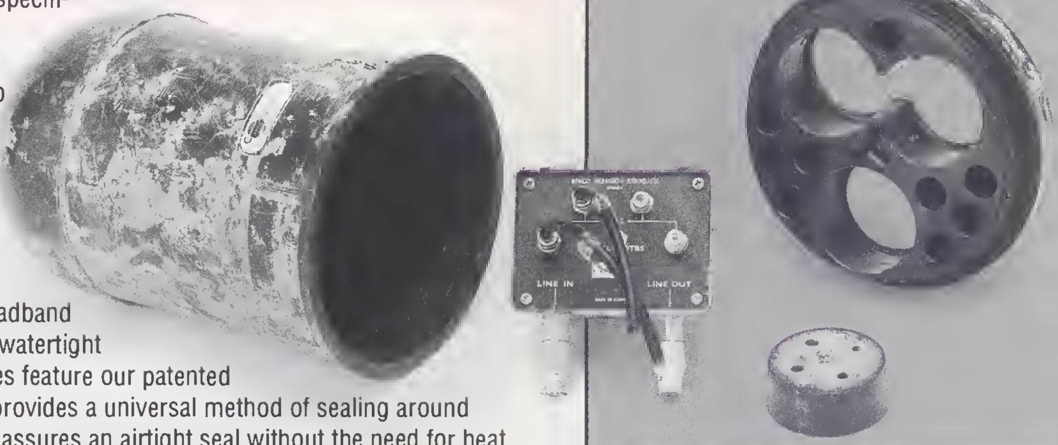

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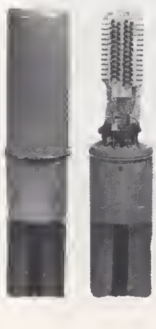

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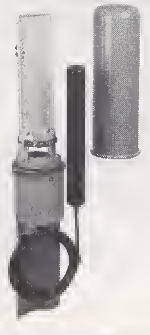

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Circle 110

ACCENT ON VOICE

Patty Wetli
Associate Editor

If you think there's only one way to say the word "car," think again. BBN Hark Systems, which develops speech recognition software, discovered that in Boston alone there are dozens of ways to pronounce the word, according to a company spokesperson.

This finding came during a recent tour of U.S. cities in the East and South. "We collected hundreds and hundreds of samples" for the company's database, says the spokesperson.

On a typical outing at the Burlington Mall in Massachusetts, the company stopped your average passers-by, including men, women and children, and asked them to speak specific sentences. "That was part of the fun of it," notes the spokesperson. Recording engineers "were excited" whenever they caught a "car" on tape. Or is it "cahr?" ■

YOU'LL NEVER GO SCORELESS AGAIN

OK sports widows and widowers, listen up. If you've had enough of monster truck pulls and feel tempted to rearrange John Madden's face the next time he diagrams a play, we've found a way for you to tear your favorite fanatic away from the television set. It's called ESPNET TO GO and it combines Motorola's wireless expertise with ESPN's sports coverage.

ESPN will provide updated scores, breaking news and analysis and commentary; Motorola's Embarc Wireless Broadcast Network will handle the transmission.

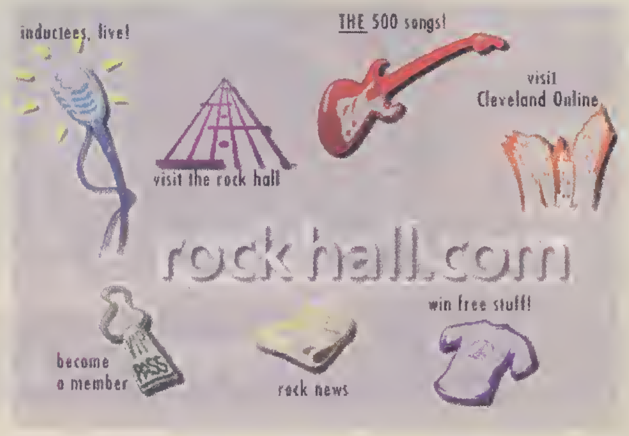
"Primarily it's for scores," says Rob Tobias, ESPN spokesperson. Though a pager-sized receiver displays as many as four lines of copy, "it's not 'War and Peace.'" The snippets of information will come from various sources, including ESPN's Internet service, according to Tobias. "We'll be utilizing a lot of the same resources."

The service will be marketed at the "serious sports fan" who doesn't necessarily want to spend every NFL Sunday chained to the boob tube. "In this day and age, people tend to participate more," explains Tobias. They may be out mountain biking or playing touch football, but still want to know how Da Bears are faring.

"I was visiting Amish country this past weekend," says Tobias. "I could have used one of these."

ROCK ON (LINE)

If your invitation to the star-studded opening of the Rock and Roll Hall of Fame and Museum got lost in the mail and you aren't planning to visit Cleveland anytime soon, you can access the Rock Hall via the Internet at http://www.rockhall.com. The Cleveland *Plain Dealer* is sponsoring the site, which features a "walking tour" of the museum plus information on each inductee and samples of their songs.



The *Plain Dealer* also snuck in some tourist information on Cleveland, including a restaurant and shopping guide and updated five-day weather forecasts. How about Indians tickets? You've got a better chance of singing backup for Elvis.

WHERE'S VANNA?

Is this the Internet or Wheel of Fortune? Lexicus, a division of Motorola, has uploaded a free demo of its new QuickPrint handwriting recognition package for General Magic's Magic Cap platform (http://www.mot.com/lexicus/QuickPrint/).

The hitch? Vowels and numbers are "turned off" during the demo and can be bought for $79 by ordering the full version of QckPrnt.

NET SURFERS PREFER BLONDES

Ellen Cotton is wowing Internet denizens with her Marilyn Monroe home page (http://www.ionet.net:80/~jellenc/marilyn.html). Just five months after receiving a Web account through Internet Oklahoma, the 58-year-old retiree set up the site, which includes a filmography, photos, memorabilia, links to other Marilyn pages and a bio of the actress.

The page has been named "Cool Site of the Day" and "Dynamic Site of the Nite." Take that, Marc Andreessen.

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INSIDE
WASHINGTON

ADMINISTRATION SOFT ON COPYRIGHT LAW IN DIGITAL AGE

Deborah Eby
Washington Editor

The Clinton administration ducked the thorniest issues surrounding intellectual property rights in cyberspace, according to those who must live under the law.

The administration's Working Group on Intellectual Property Rights has recommended only modest changes to update the Copyright Act for a digitized, networked marketplace.

"We don't need to reinvent the wheel," says Bruce Lehman, working group chairman and Commissioner of Patents and Trademarks. "The existing copyright system works quite well. We need to answer a few questions in the statute as to how it works."

The group's 250-page report recommends, for instance, that the law broaden the definition of "published" to include distribution of creative works via computer transmissions that fall within the exclusive distribution rights of the copyright owner. Amended exemptions would allow libraries to make three digital copies of a work and create digitized copies for preservation purposes.

All well and good, notes one public interest advocate, but the administration "essentially ducked" the issue of who's liable when copyright infringement occurs. "There are arguments that the carriers should be liable if they knew or should have known. The question is, what is knowledge and what are the responsibilities of a carrier to monitor what's coming across their network?

"I don't think that anyone has raised the issue about a pure telephone company being liable," he continues. "The trouble is that many carriers are quasi-carriers and content providers at the same time. That's true not only for America Online, but it's going to be true for Bell Atlantic and the cable companies and everyone else."

Congress must tackle the issue "because it's too confusing to leave it up to a whole bunch of courts to go in 12 different directions."

Meanwhile, tension builds between content providers, "who want everyone in the chain to be liable," and carriers, "who want to be reasonable, but don't want to impair the free flow of information."

HANDS-OFF APPROACH - "I have no doubt there will be considerable unauthorized copying, but the law can only go so far. We're not going to have copyright police," says Bruce Lehman, Commissioner of Patents and Trademarks.

THE PUBLIC GOOD

Librarians and educators are disturbed about the report's tilt toward commercially exploiting the Information Superhighway without proportionately broadening public access to digitized material.

"Libraries certainly are in favor of creating jobs and exploiting in a responsible way the commercial potential of networks," explains Adam Eisgrau, legislative counsel to the American Library Association. "But it's very easy in this environment to start from the premise that you balance public interest and commercial interest. You don't. The premise of copyright law is do what's good for the public. Straight out of the Constitution, it's to 'promote the progress of science and useful arts.'"

NO COPYRIGHT POLICE

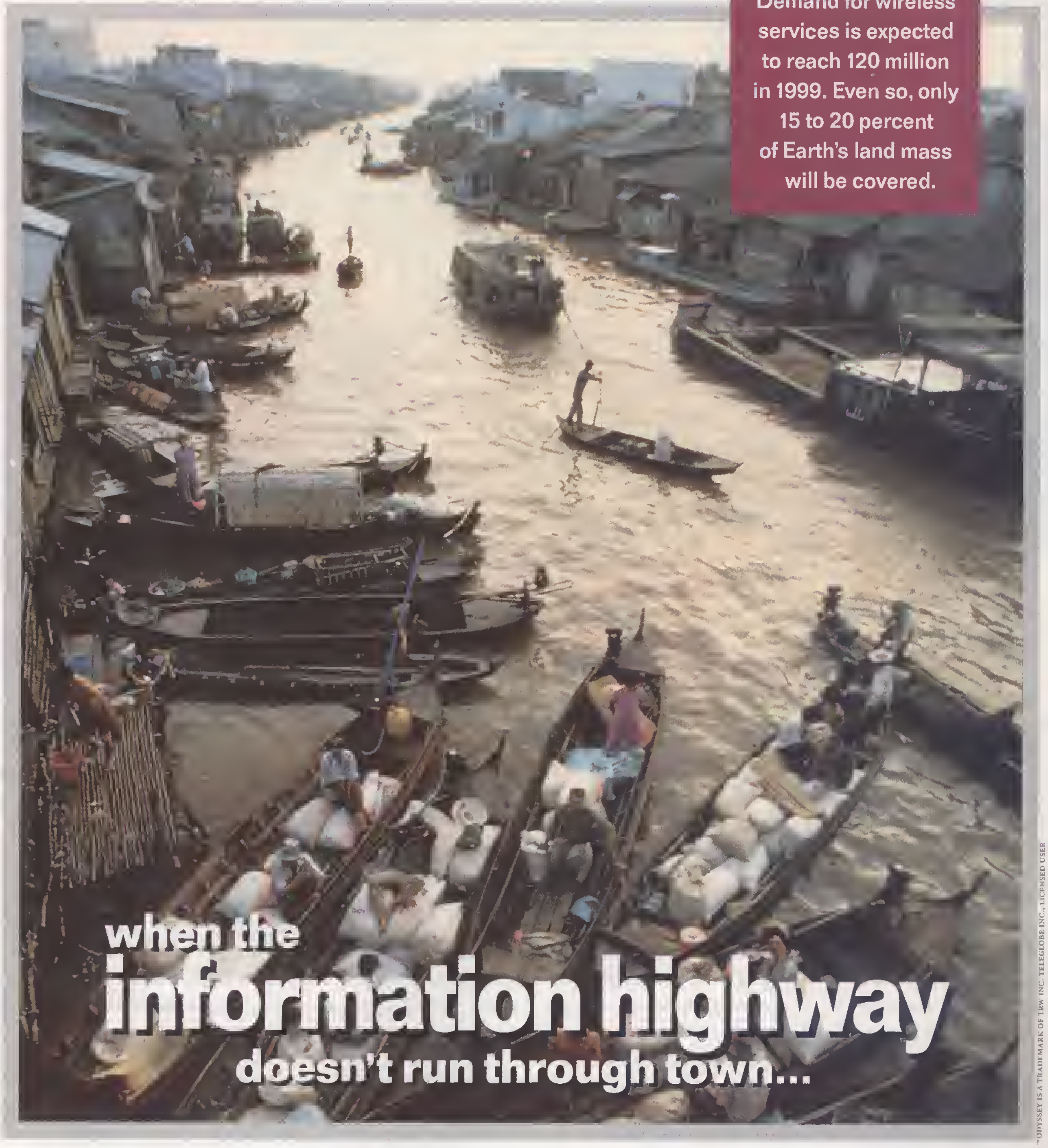
Some content providers claim the administration's report lacks enforcement recommendations, declaring that protections are impotent if they can be violated easily.

"I have no doubt there will be considerable unauthorized copying," admits Lehman, "but the law can only go so far. We're not going to have copyright police." He notes that infringement already is a fact of life, with half the software market supplied by pirated products.

"We feel fairly comfortable that there will be adequate protections against truly large-scale piracy, particularly piracy of a commercial nature."

Copyright management software will take some of the enforcement heat off Congress by embedding protections into on-line products. Although it may help ease the fears of copyright owners, protection software could further fan the flames of the public access debate. Once licensing protections are embedded in products, Eisgrau is concerned Congress will ignore the need for "fair use" exceptions for educational purposes.

When Congress focuses on the next round of intellectual property changes for the digital age, Lehman leaves no doubt where the administration will place its emphasis. "We want this to be a source of new jobs, new commercial opportunities and new products for the public. The changes we have recommended strike the proper balance without setting up a system of video police. If we can focus on that rather than make this into a morality thing, then I think we're looking in the right direction." ■



Demand for wireless services is expected to reach 120 million in 1999. Even so, only 15 to 20 percent of Earth's land mass will be covered.

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Circle 139

ONE-NUMBER SERVICE REBOUNDS WITH MORE CONSUMER OPTIONS

Vince Vittore
Associate Editor

The days of carriers touting single-number service for everyone are over. Just less than two years ago, several carriers were promoting the concept of carrying a single phone number from cradle to grave.

But a heaping dose of reality has quashed those early predictions. Bell Atlantic Mobile spent millions on a trial only to learn most consumers want to separate their business and personal lives.

"After the initial excitement, there's been some realization of how complex the process really is," says Andy Dale, vice president-marketing and business development for Priority Call Management. "It's kind of like voice mail. It's going to take a while for business to pick up and work out all the kinks."

Carriers seem willing to try. As they take a second look at the platforms that provide single-number service, they're finding systems that do everything expected and more.

One of the biggest enhancements: giving consumers more control. "People don't want to be more available," says Dale. "They want to get their valuable calls. It's an application-level need that people have, not a technology need."

For companies in the single-number business, that means letting consumers decide how they want their calls handled. Priority Call's platform, for instance, lets callers leave a voice mail message without even attempting to find the called party. "That's actually a very significant choice," says Dale. "There are a lot of times when people just want to leave a message."

The single-number concept also has evolved as companies begin integrating platforms with other technologies, allowing both inbound and outbound service. Just last month, Priority Call Management announced three enhancements to its Oryx platform, including voice activated dialing, conference calling and single-number workgroup capabilities.

AccessLine Technologies, one of the first companies to develop a single-number platform, also is adding enhancements to its line such as voice mail rebounding.

PEOPLE DON'T WANT TO BE MORE AVAILABLE. THEY WANT TO GET THEIR VALUABLE CALLS. IT'S AN APPLICATION-LEVEL NEED THAT PEOPLE HAVE, NOT A TECHNOLOGY NEED.

With the latter service, callers picking up their messages can return calls automatically even if they don't know the return phone number. Voice mail rebound works by giving callers a prompt after leaving a message. The caller then can input a number at which they can be reached or simply hang up, in which case the caller's ANI is stored as part of the message and is used to return the phone call. When the message is retrieved, the system provides a series of options including call-back.

"We can do ANI, but oftentimes the person who leaves the message doesn't want to be called back at that number," explains Kim Tassin, AccessLine Technologies spokesperson.

The company also has licensed its technology to IBM, which is building a service that combines voice, fax, e-mail and remote LAN access into a single number. "The goal here is to integrate voice and data. Our engineers are building an interface to the IBM system," she says, adding the next step is to build text-to-speech technology into the platform.

More recently, AccessLine formed an alliance with Octel, which will use single-number technology in its voice mail systems.

Priority Call's newest enhancements appear to concentrate more on multi-user applications, though it has added voice dialing capabilities to its platform. One new software feature lets users conference several parties without the usual advance set up. The application will target corporate executives, says Dale. "It's particularly important for mobile people to do conferencing on the fly."

WORKGROUP APPLICATIONS

Perhaps even more significant is the company's expansion of one-number service to workgroups. Comparing it to a wireless ACD system, Dale says one-number workgroups will allow service technicians and customer service personnel to answer calls from any location. This is an especially useful feature for companies that have group sales forces.

With one-number workgroup service, a customer could use a single-number and the platform would route calls to one of several locations, even ringing multiple phones simultaneously and switching the call to the phone that answers first. "We feel like what we're doing is intelligent network. As the intelligent network actually begins to be there, we're excited about the possibilities of converting with that," says Dale, adding the new enhancements actually give users a new way to justify the cost of single-number platforms. "We're focused on applications that are the dreams of the marketing department." ■

Many of These New Office Buildings Are Demanding More Lines

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Circle 111

■ VIDEO SERVICES

CATV REVOLUTION GETS UNDER WAY IN OMAHA

U S West goes after real, live, paying customers in market trial of its video offering.

Patty Wetli
Associate Editor

The telcos are coming. The telcos are coming. One if by fiber, two if by HFC. For years, cable TV companies have been told a revolution was afoot—and now the opposition's finally mustering the troops in Omaha.

Its technical trial recently concluded, U S West's no longer relying on "friendly" users to test its HFC CATV network. Instead, the RBOC's racing the clock, in the early stages of a one-year market trial aimed at signing up real, live, paying customers for its video offering.

"We first made our announcement in '93," says U S West spokesperson Bob Kelley. "There was so much work to do, the media became very anxious." But while some reporters were wringing their hands, the RBOC quietly went about building out its network and jumping through regulatory hoops. And now it's ready to turn up service, at least temporarily.

"At the end of one year, we don't know what we'll be allowed to do," says Kelley. "Our expectation is that service will continue."

Despite the project's potential lame-duck status, U S West has put together top-notch programming and pricing packages that are anything but lame. Its "Basic 12" is a bargain-basement requirement. "It gets you into the game" as lifeline cable—the big three networks, Fox, PBS, Home Shopping Network and two (!) versions of C-SPAN, Kelley says. About 5% of cable TV subscribers go for such a basic option, typically to improve reception.

ONE SMALL STEP FOR U S WEST - Like the move from black and white to color, the introduction of TeleChoice signals a new era in television. "Our vision is that interactive networks will forever change the way people complete transactions, communicate and seek information," says Sol Trujillo, U S West president and chief executive officer. The RBOC's market trial of its TeleChoice service is the first step in that direction.

SLICING AND DICING

It's a pretty safe bet most customers will opt to add on one of U S West's other packages—sports, news and information, family or variety. And this is where the telco differentiates itself from most other CATV providers. For an additional $5.95 per package, customers can add one or more of these options and tailor the number and types of channels to their own interests. Or they can order the entire enchilada for $19.95, which still is lower than what most cable companies charge for comparable programming.

"They don't let you slice and dice," says Kelley.

Actually, some of them do. Cox Communications, which will be competing with U S West, offers some product tiers aimed at niches such as sports or history. But that option is not available in Omaha, according to Cox spokesperson Ellen East.

"They have things we don't have [i.e., The Sega Channel], we have things they don't have," says East. She notes that of Cox's 106,000 customers in Omaha, U S West's limited trial territory overlaps a mere 10,000, so the cable company's not exactly shaking in its set-tops. "Our whole attitude is we've been there 15 years. We have a great programming line-up. We think our customers will stay with Cox."

Certainly, Cox has brand recognition on its side—the RBOC's "TeleChoice" service hardly is a household name. But Kelley believes branding alone won't win

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30 ☐ Independent Telephone Company

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55 ☐ Independent Cable TV System
60 ☐ Cable TV Contractor/Engineering Firm
65 ☐ Other Cable
Wireless Operators
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195 ☐ PCS/PCN Operator
205 ☐ Other Wireless
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185 ☐ **Competitive Access Provider (CAP)**
220 ☐ **Telecommunications Reseller**
170 ☐ Other Carrier
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20 ☐ GTE
30 ☐ Independent Telephone Company

OTHER SERVICE PROVIDERS
Cable TV (CATV) System Operator
50 ☐ MSO (Two or more Cable TV Systems)
55 ☐ Independent Cable TV System
60 ☐ Cable TV Contractor/Engineering Firm
65 ☐ Other Cable
Wireless Operators
190 ☐ Cellular Operator
195 ☐ PCS/PCN Operator
205 ☐ Other Wireless
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4 ☐ **Legal, Financial, Regulatory or Processing Services** (Director or Manager of Rate Planning & Administration, Settlements & Contracts, Service Costs, Methods, EDP or IS Operations)
5 ☐ **Personnel & Administrative Services** (Director or Manager of Training, Safety, Security, Buildings & Land, Purchasing, Supplies & Distribution)
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Interface Communications put together U S West's programming and pricing packages, which Kelley deems compelling enough to woo customers away from entrenched providers. And if that doesn't work, Kelley says U S West will hit rivals where they appear most vulnerable—customer service. "We think it is a significant ingredient," he says.

To that end, the company is promising two-hour installation windows and offering free installation if technicians are more than 30 minutes late. Weekly gratis copies of TV Guide will be tossed in as an added enticement.

Cox is countering with an f-word of its own—free LocalLink service to customers in Omaha. The package is comparable to U S West's Basic 12 and carries 21 channels. "We've been looking at competition from other sources," says East, particularly from purveyors of direct broadcast satellite service. So the cable company has been doing a "lot of innovative things" mainly on the marketing and branding fronts to build customer loyalty. She also points to O2TV, a strong local channel Cox developed. Programming includes local news and sports—a direct hit against direct broadcast but perhaps less of a threat to U S West.

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EMERGING TECHNOLOGY, THERE WILL ALWAYS BE IMPROVEMENT.

What about interactivity? Not tomorrow, or even the year after. "My feeling is that the interactive stuff will happen," says Kelley. But the "technology is far more complex than the most pessimistic" naysayers had anticipated.

"Interactive is going to come on line as developed," he predicts. "There's not going to be a flash-cut [to digital]. Like any emerging technology, there will always be improvement."

Meanwhile, TeleChoice will have to win customers on its own merit as a relatively unique CATV service. It may not be revolutionary—yet—but it's no King George, either. ■

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of a one-year market trial aimed at signing up real, live, paying customers for its video offering.

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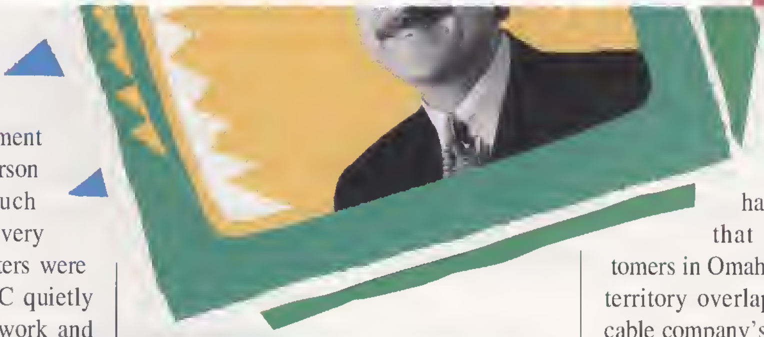

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PUTTING IT TOGETHER

ONE-OF-A-KIND NETWORK

U S West's video dialtone network passes 50,000 households in Omaha and features analog-based basic and premium cable television programming. The channel line-up includes familiar names like ESPN, CNN and MTV. Subscribers also will find newcomers like Home and Garden Television and the Golf Channel.

Similarly, the VDT network architecture and its piece parts include something old and something new. Suppliers include standby AT&T, whose Network Systems aided in construction, for telephony components; Scientific-Atlanta for video transmission components; 3DO for software within the set-tops and content for interactive games; CSG for billing; New Century Communications for subscriber-management software; and Digital Equipment Corp. for video service.

The sum of all these parts: a hybrid fiber-to-the-curb/coaxial "passband" network. Under the network design, analog and digital video signals travel on fiber optics to a 400-home node and then via coax into individual homes.

Voice and data service are sent over a separate transmission path, according to U S West spokesperson Bob Kelley. Like video signals, voice and data initially travel over fiber but traffic terminates to an eight-home optical interface and then into individual homes via copper lines.

"It's a one-of-a-kind network in Omaha," says Kelley. Architecture choices the company made back in 1993 when it first announced construction of the network may not make sense for future buildouts. "Now there are more cost-efficient ways" of designing a network, he notes. "The technology is changing so rapidly."

This particular design will be "unique to Omaha," according to Kelley. But that's what trials are all about—finding out what works and what doesn't and doing it better the next time.

---

this battle, services will. U S West's premium movie packages offer, for example, three channels of HBO. "There are additional movies on [HBO] Three that aren't on Two," he explains. All of which can be viewed without a cable converter, which Kelley considers a "strong product benefit." The signal is descrambled before it hits the home, negating the need for a converter box and also allowing subscribers to tape a movie while watching another channel.

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Cox is countering with an f-word of its own—free LocalLink service to customers in Omaha. The package is comparable to U S West's Basic 12 and carries 21 channels. "They've taken predatory pricing to a whole new level," says Kelley. But East claims the move has nothing to do with U S West. "The plans were there" before U S West began its market trial.

But Cox isn't burying its head in the sand. "We've been looking at competition from other sources," says East, particularly from purveyors of direct broadcast satellite service. So the cable company has been doing a "lot of innovative things" mainly on the marketing and branding fronts to build customer loyalty. She also points to O2TV, a strong local channel Cox developed. Programming includes local news and sports—a direct hit against direct broadcast but perhaps less of a threat to U S West.

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Kelley, for one, welcomes whatever Cox or any other cable company has to throw the RBOC's way. "Omaha was specifically chosen" because it's a competitive market, he explains. To gain respectable market share "would signify real choice. This will tell us we've got a strong competitive offering."

The company intends to spruce up that product before the end of the market trial, adding video on demand to the mix. What about interactivity? Not tomorrow, or even the year after. "My feeling is that the interactive stuff will happen," says Kelley. But the "technology is far more complex than the most pessimistic" naysayers had anticipated.

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INTERNET AUDITING

DEMAND FOR ACCOUNTABILITY

Patty Wetli
Associate Editor

People have been throwing money at the World Wide Web, putting up sites with no idea how much traffic they're generating. "How sustainable is that?" asks Tina Lin, director-business development for Internet Profiles Corp. (I/Pro), which independently measures and analyzes Web site usage.

Content providers want "programming" feedback—what's of interest, what's not—and potential advertisers want verifiable numbers before they sponsor or subsidize a site. "If they want to run some kind of information or commercial on a Web page, they want to know if anybody's looking at it," says Jack Loftus, spokesperson for Nielsen Media Research, the television audience information service, which recently entered into an alliance with I/Pro.

Though I/Pro has attracted clients since last May's service launch, Lin notes, "We are a start-up. When you talk to the top companies, having Nielsen on board adds credibility." I/Pro has the software ("They're really plugged in," says Loftus), and Nielsen brings its technology, marketing expertise and believability. "When Nielsen tells an advertiser, 'This is the way it is,' they can take it to the bank," claims Loftus.

FEEDBACK CRITICAL TO ADVERTISERS

The alliance will focus on joint marketing and co-branding of two I/Pro products: I/Count and I/Audit. I/Count is aimed at Web site owners, providing greater detail on numbers and types of visitors. The software distinguishes between "hits" and visitors, Lin explains. "Hit doesn't mean anything." Six graphics on a home page translate into seven hits. "In most cases, that's very confusing," she says. "You have no idea how many people that [translates] to."

I/Count takes a site's transfer log files nightly and translates IP addresses into domain or organization names. "We can tell you XYZ Corp. is in Redmond, Washington," and profile usage, Lin notes. For example, the software can analyze traffic by region, tally average session length or break down use by day of the week. With this kind of information, "I can 'program' my Web site better," says Loftus.

I/Audit is an independent auditing and verification service used to sell advertising. "Clearly there's been a need for this for quite some time," says Lin. "Advertisers are asking for some sort of report. Some sort of feedback measurement is critical."

Lacking that measurement, only a handful of sites such as Yahoo have been able to sell advertising, she adds. "Now I can't imagine anyone putting up a site without having measuring capability. It was an unsustainable period in which people could just be out there." Loftus believes advertisers have been holding back, waiting for hard numbers to justify expenditures.

Now he envisions a meeting of the minds between site owners and advertis-

continued on page **26**

Rating Real 'Hits'

Internet content providers often promote the popularity of their sites by bragging about the number of "hits" received. But according to I/Pro's Tina Lin and Nielsen's Jack Loftus, the term is not only meaningless but often misleading. "We're talking about visits, not hits," says Loftus.

The two are not interchangeable, and most would agree the former is a far better measure of who is accessing a site and what information they find of value. "Hits don't mean anything," says Loftus. If a site includes five files, for example, and there are five icons in each file, that counts as 25 hits—whether the visitor actually reads the information or is simply clicking around in rapid-fire fashion.

I/Pro's software tracks actual visitors, noting how much time is spent on a page and the origin of the visitor. While it can't necessarily give the content provider the name, rank and serial number of each visitor, it can tell what company the visitor works for, for example, where that company is located and what type of people work there.

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Circle 114

I/PRO

continued from page **22**

ers. All the top sites are looking for advertising support, often tailored to corporate users. Lin notes the preponderance of pitchmen such as Mastercard, IBM, MCI and the like. But "I absolutely think that's going to change," she says, pointing to Gatorade's presence on ESPN's site.

That marketing effort may prove a harbinger of things to come, as the Internet moves closer to the television model and away from an esoteric academic stronghold. Loftus notes that I/Pro services don't yet provide the same demographic figures as TV ratings but believes that will come later.

"In the early days of television and radio, the medium and the measurement grew together," he says. Reliable methods were developed to determine who was watching and who was listening. Loftus believes the same evolution will happen with the Net. Though acknowledging the media are different, he says the "common denominator is information."

I/Pro's software is the first step toward what ultimately could evolve into a rating system. "This is the first start, providing information to Web site owners and turning that information around to advertisers," notes Loftus.

ADVERTISERS ARE ASKING FOR SOME SORT OF REPORT. SOME SORT OF FEEDBACK MECHANISM IS CRITICAL.

The next step would involve creating sample groups and gathering census-type information—the kind of work Nielsen can perform blindfolded. And Lin agrees the market is ripe for some sort of rating system. "I think that that is something that's not that far off. Even now, a lot of people are asking for that information," she says, adding that benchmarking is one of I/Pro's short- to medium-term goals.

The company already has proved fairly aggressive in an uncrowded field. "Competing companies don't have any clients," notes Loftus. Many still are testing software, including vocal rival WebTrack, which has criticized I/Pro's method of collecting data from the publisher's usage log.

Who ultimately will emerge victorious remains to be seen. But I/Pro does have Nielsen's considerable backing as a potential ace in the hole. And as Loftus says, "We've got a real jump start out there running full speed."

"Our goal is to become the standard," adds Lin.

Next thing you know, they'll be printing top ten lists faster than David Letterman. Can an awards show be far behind? ■

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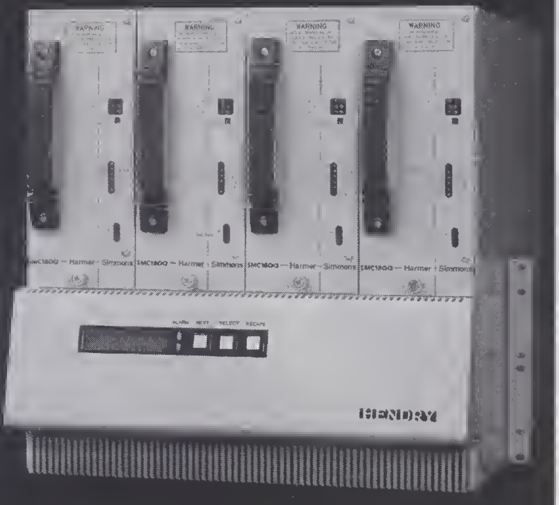

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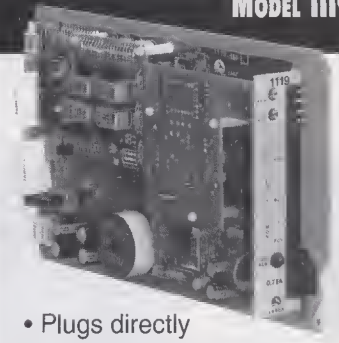

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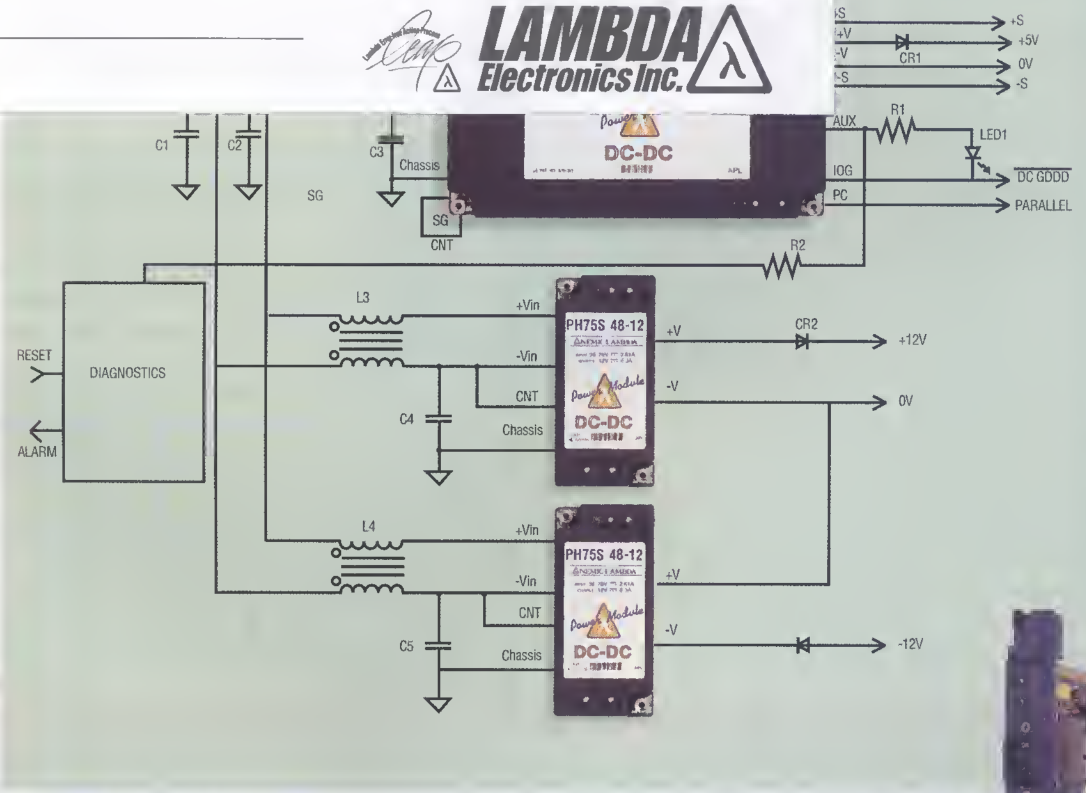

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I/PRO

continued from page **22**

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"Our goal is to become the standard," adds Lin.

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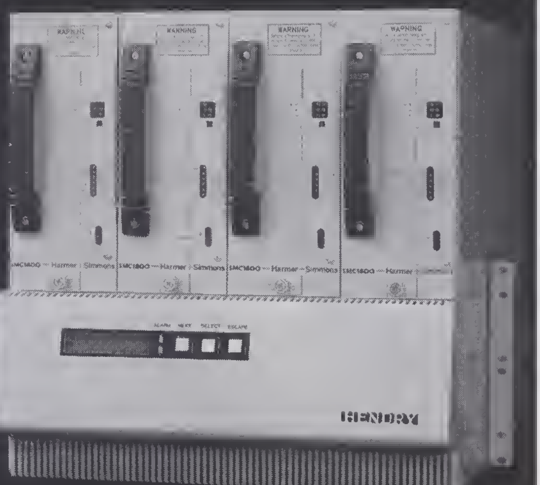

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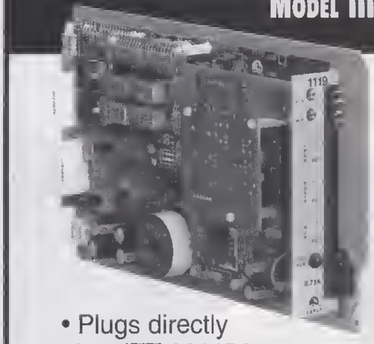

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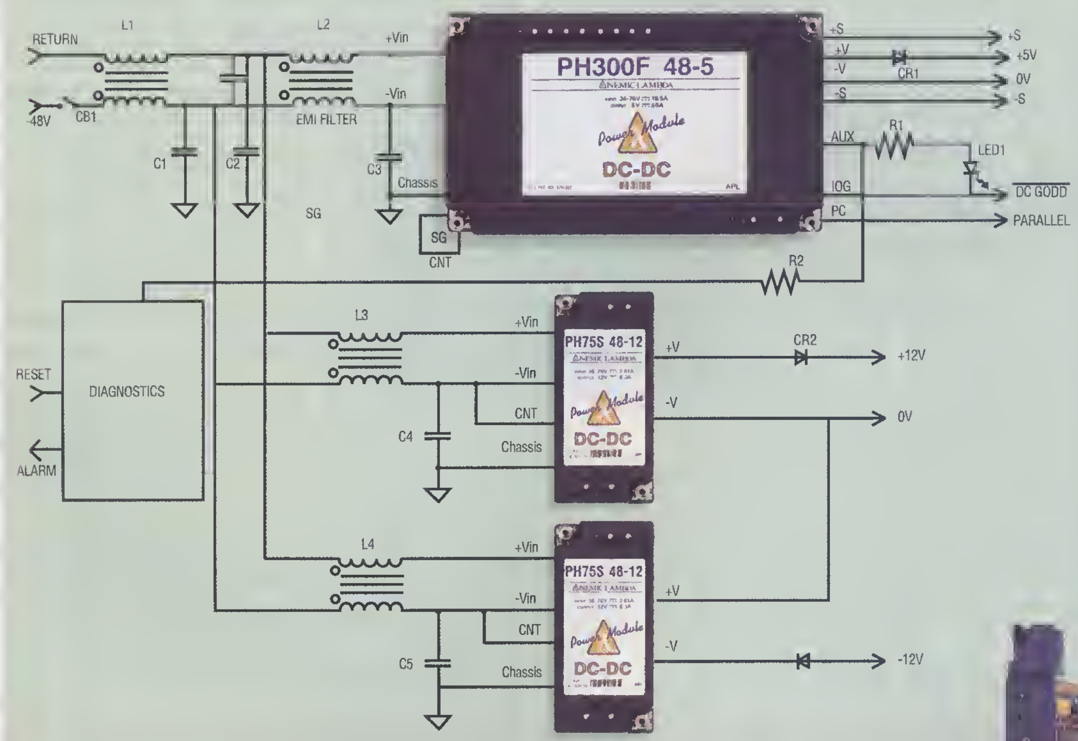

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WIRELESS SERVICES

VOICE PAGING FILLS SERVICE NICHE

Using spare capacity on cellular networks, voice messaging technique combines the best of voice mail and paging.

Mark Dziatkiewicz
Technology Editor

Ratcheting communications accessibility one notch higher, ReadyCom's voice messaging technology offers cellular carriers service differentiation and new revenue opportunities without additional infrastructure investment.

Patented store-and-forward technology improves voice mail's effectiveness by giving subscribers two-way messaging capability from the same handset. "There's been a lot of research to support the idea that voice paging is important and customers want to avail themselves of it," says Kevin Leibel, ReadyCom director-marketing. But traditional voice mail and paging have limitations, he claims.

Alphanumeric paging often is cryptic and limiting when sending detailed messages. And voice mail's only as current as the last time you checked it—plus you're socked with airtime whenever you dial in to see who's called. With ReadyCom's technology, subscribers receive voice mail in their pocket. A wireless, pocket-sized voice messaging receiver stores as many as 12 minutes of over-the-air messages for later playback. Messages can be saved or erased individually.

NEW GADGET - ReadyTalk device replaces pager.

ReadyTalk, ReadyCom's voice messaging service, uses spare capacity on existing cellular networks. "What's different is it's using the cellular spectrum as opposed to the paging spectrum," explains Leibel. "We use idle capacity on the cellular network, require one voice channel and do not use frequency hopping."

Because it works in conjunction with the cellular network, no infrastructure investment is required. ReadyCom's voice mail platform connects to the cellular switch, subscribers receive a replacement handset and the service is ready to go.

ReadyCom uses non-real-time transmission to send voice mail messages. Subscribers receive beeps, vibrations or lights indicating a message. They can listen and then press a button to return a message.

"The system stacks, compresses and stages sending [of messages]," he says. "Because it's non-real time, [messages] can be manipulated. They can be compressed or queued up. Or I can wait until I

continued on page **32**

MERGERS & ACQUISITIONS

BELLSOUTH BIDS ADIEU TO ITS PAGING SUBSIDIARY

With an eye on other domestic and international opportunities, BellSouth cut loose its paging subsidiary, MobileComm, for $945 million. To sweeten the pot for buyer MobileMedia Corp., the RBOC tossed in its two-way nationwide narrowband PCS licenses for good measure.

The combined MobleMedia and MobileComm will have about 4 million subscribers and revenues in excess of $560 million.

"It was a question of timing," BellSouth spokesperson Tim Klein says of the sale. With increasing consolidation within the paging industry, the RBOC had to fish or cut bait. To compete against paging giants would have required "strong commitment of money and resources," a commitment BellSouth chose not to make. Instead, the telco decided to divest itself of the physical asset while retaining the right to resell paging services.

The deal proves you can have your cake and eat it, too. The resale option allows BellSouth to keep paging in its portfolio of services and continue working toward its goal of becoming the total and top communications provider in the Southeast. At the same time, the deal "gives us $950 million" to invest elsewhere, according to Klein.

MobileMedia makes out as well. Along with the company's recent acquisition of Dial Page, MobileComm proves another jewel in its crown and furthers its efforts to create "the pre-eminent wireless messaging company," according to a statement by Gregory Rorke, chief executive officer of MobileMedia.

BellSouth believes it found a good home for MobileComm. "They [MobileMedia] value MobileComm as much as we did," says Klein, "and they've got the skill, knowledge, experience and commitment" to grow the business. And now BellSouth has a nice chunk of change to do the same.—*Patty Wetli, associate editor*

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VOICE PAGING

continued from page ***30***

have a few messages for the same individual," Leibel continues.

Customers respond through the same device—in non-real time—as they might with traditional voice mail services. "It's like a wireless answering machine, which means I can put it in my pocket and take it anywhere," he explains. "Unlike some other products with limited reply capability, this is full 100% messaging and the only two-way non-real-time voice messaging offering out there today."

Even in non-real time, all messages are sent within minutes of receipt. And no additional burden is placed on already strained cellular networks. "Even if the cellular system is at full capacity, on a 200-cell site system, 2 million voice paging customers could be added," claims Leibel. "We're selling a very attractive solution for the cellular carriers."

But it isn't for cellular carriers alone. ReadyCom envisions paging companies offering ReadyTalk in conjunction with cellular carriers. "For paging companies, it's an opportunity to get involved in voice paging," he says. "The effective distribution channel is the paging companies, and the cellular companies get the advantage of additional airtime used."

LINING UP SERVICE PROVIDERS

A trial later this year will test ReadyTalk on BellSouth's cellular network. "We have agreements with MobileComm and BellSouth for wireless service in Miami and Nashville and with Comcast in Philadelphia," adds Leibel. MobileComm, BellSouth's former paging subsidiary (*see sidebar, page 30*), is enthusiastic about offering the new service.

"It's another level of our PCS family of services," says MobileComm spokesperson Jean Coppenbarger. "In some cases, people may prefer a voice-type product" but don't need full-blown cellular service. She notes that "so many people have gotten used to voice mail in their office" and want the same service on the go, further proof of the preference for messaging communications as opposed to lengthy conversations.

But are subscribers looking for yet another communications device? ReadyCom thinks the pros outweigh the cons. Subscribers already have pagers and may have cellular phones. ReadyTalk's device replaces traditional pagers with enhanced capability. Cellular options are unchanged.

"It's not unusual to have to offer a new handset in order to offer a new service," contends Leibel. "We are creating price points that will be competitive and will work with paging companies to provide a product and service priced appropriately for the market."

For less than $30 per month, customers will get their voice mail to go, and wireless carriers move one step closer to providing total communications solutions. ■

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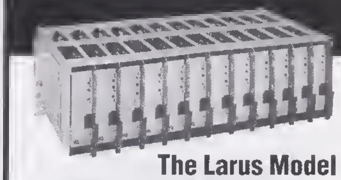

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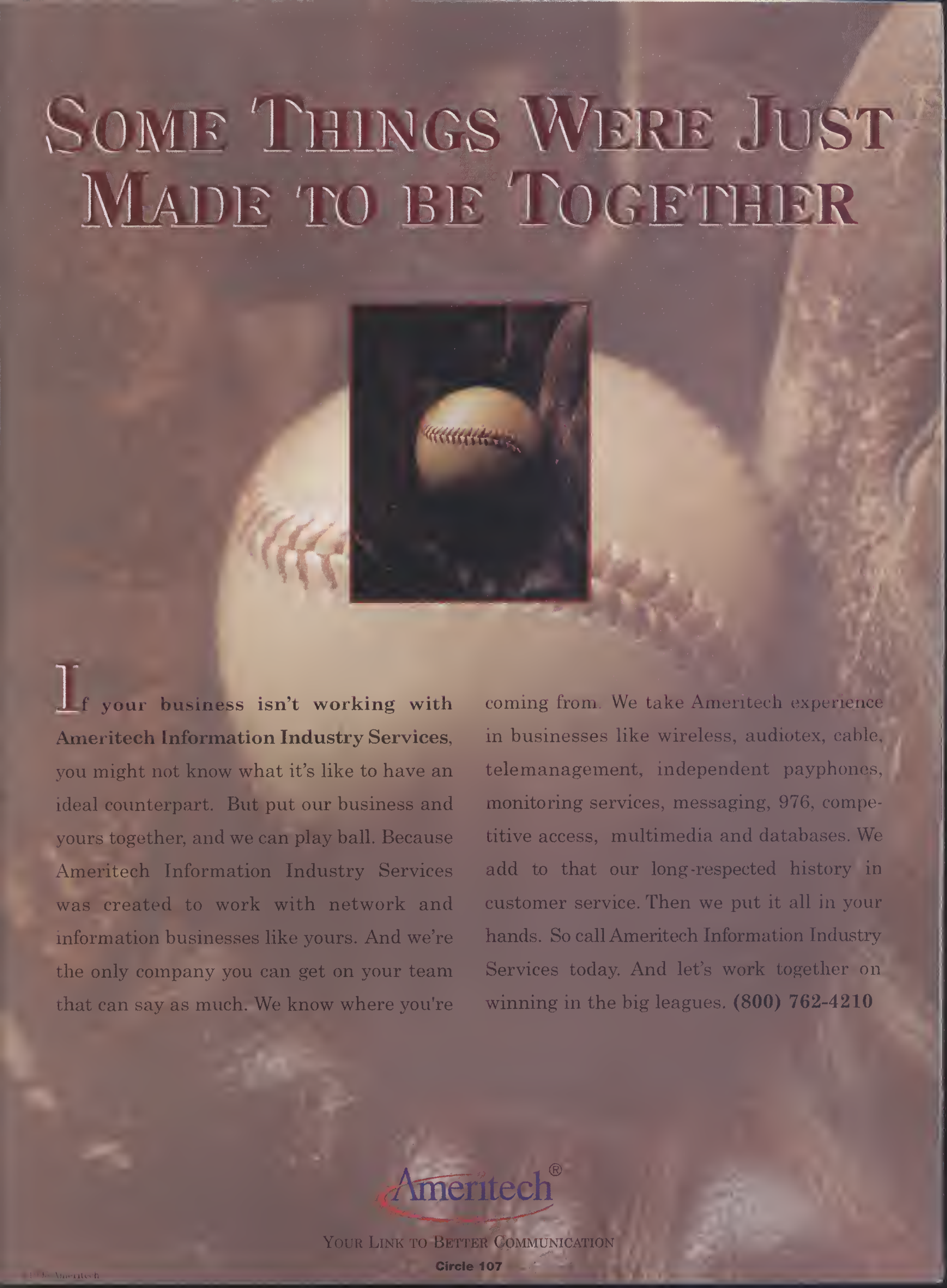

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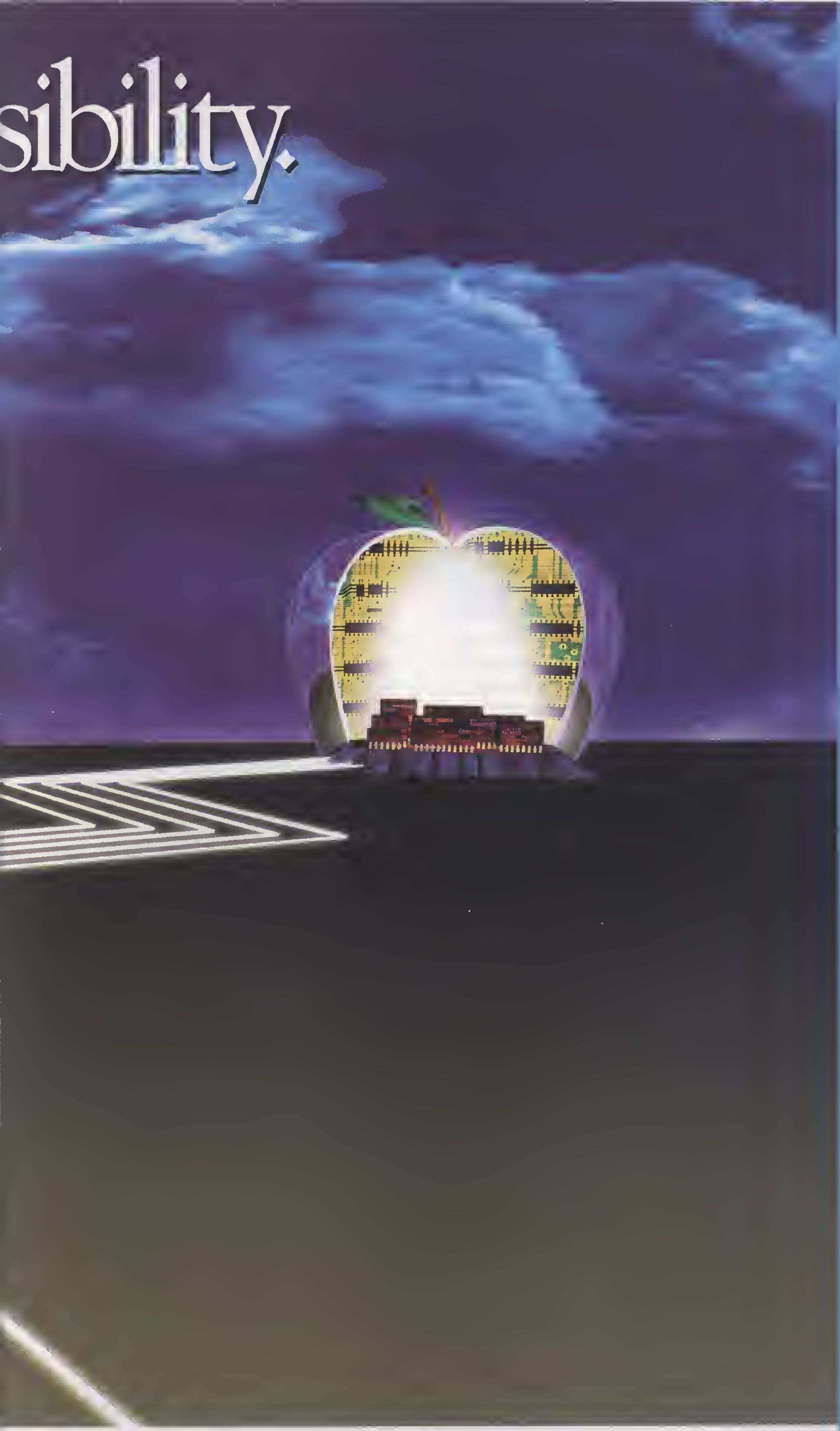

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■ INTERNET ACCESS

SPRINT OFFERS UNIVERSITIES INSTANT ACCESS TO THE NET

Deborah Eby
Washington Editor

Dial-up Internet access is one of the hottest back-to-school essentials on campuses this fall. But overwhelming demand is creating headaches for university telecom administrators.

Sprint has come to the rescue with a service that aims to ease the strain on universities while tapping into one of the largest segments of Internet users. Students and faculty depend on the Internet to deliver a growing list of services including registration, course materials, research and distance learning.

With a quick stop at the nearest SprintLink kiosk, students and staff will be able to order instant Internet access at $12.50 a month for 165 hours.

BETTER THAN A TEXTBOOK - SprintLink kiosks will provide instant Internet access for $12.50 a month.

"Universities have traditionally provided free access," notes Michael Liacko, Sprint state manager, colleges and universities. "The problem is, demand for the Internet wasn't that great when they started giving it away." Now colleges are struggling to provide "free" access at $1200-$1300 for a dial-in port, plus maintenance and personnel costs.

"SprintLink on Campus," a turnkey system based on the company's commercial Internet access service, requires no capital outlay by the university. And for the price of a textbook, students can buy a semester's worth of faster (28.8 bps), higher-quality access than their school can offer for free.

The service already boasts a customer: California's state university system, with 475,000 students, faculty and staff on 22 campuses. Liacko hopes 30% of that population will be purchasing Internet access at SprintLink kiosks within two years.

"California is probably the most significant foothold in the educational marketplace," boasting 1.8 million college students, with New York a close second. Nationwide, Liacko estimates that of the 5% of Americans using Internet, 25% are college students.

ACCESS TO GO

The carrier is installing a SprintLink node on each Cal State campus, with dedicated access to the company's TCP/IP network. Sprint initially will install 144 ports per site to support 2500 subscribers. Nodes can be upgraded in 144-port modules as subscribership grows and will support analog, SLIP and PP dial-up access.

The nodes also include modem emulation firmware that allows Sprint to download upgrades from its network control center. Proprietary software adapted from the carrier's high-speed credit card processing application provides accelerated call set-up and tear-down.

Users will order Internet access at North Communications' interactive, touch-screen kiosks connected via Sprint frame relay to North's databases, financial server and monitoring equipment in Marina Del Rey. Monitoring services include a daily reconciliation of transactions and the shut-down of an account and user notification if fraud is suspected.

Students who pay with credit or debit cards will have live accounts immediately and receive a receipt with their password, user ID, local access number and help desk number. Those paying by check will receive a mailing address for their payment, and access will be turned up as soon as checks are processed. Data traveling between the kiosks and North will be encrypted.

North will maintain a 24-hour, seven-day-a-week 800 hot line and screen calls to determine whether problems are user-based or network snafus that must be passed to Sprint's own network control center.

SprintLink on Campus can support ISDN basic rate interface, expected to be offered over the Cal State system within a year. Liacko expects ISDN access to be especially popular among medical students who want to move medical images back and forth via the Internet.

TOMORROW THE WORLD

Liacko emphasizes the kiosks can do more than sign up Internet accounts. Students can access grades, transcripts and class and registration information. SprintLink on Campus could connect with North's Info/California network to offer vehicle registration, on-line "Quick Court" and a variety of other official transactions. Sprint also has an application ready to offer kiosk-to-kiosk video conferencing.

Liacko is thinking big when assessing the potential market for SprintLink on Campus. "As it is deployed nationally and even globally, it becomes not only a mechanism to set up your accounts. It becomes a true tool and communications opportunity for students, faculty and staff." ■

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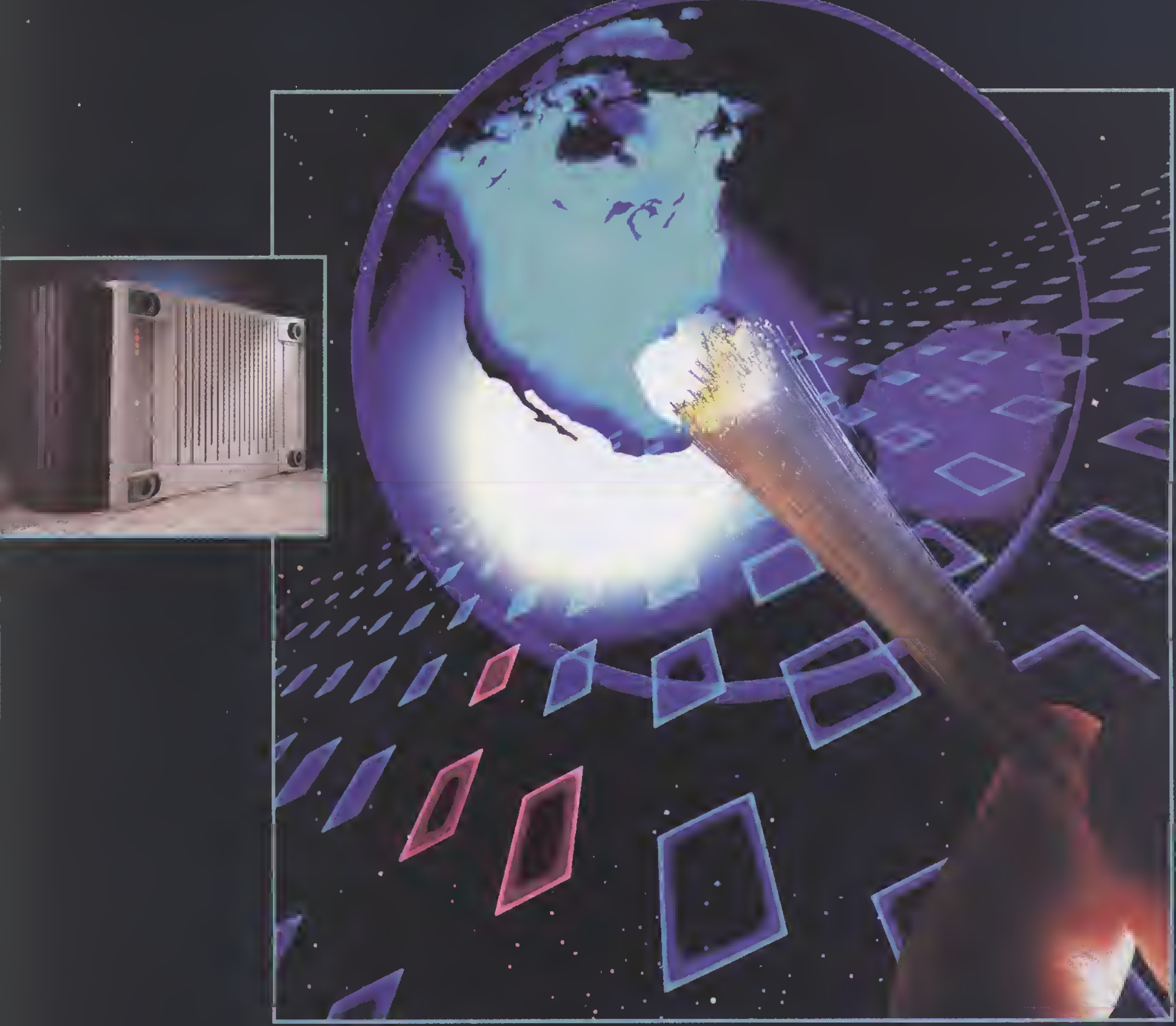

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SET-TOPS

ANALOG LIVES

Digital set-tops likely won't emerge in large numbers until the 21st century. But that doesn't mean the analog world will stand still.

Eric Krapf
Managing Editor

When Scientific-Atlanta's Robert A. Luff talks about "the hottest-selling product in the industry," he's not referring to some souped-up interactive digital set-top, but to a next-generation analog box. The difference is between "hottest," which could refer to any gee-whiz technology George Gilder thinks will change the world, and "hottest selling," which could only refer to a real product—which by definition means analog.

"We just don't see a digital-only box until well well into the next century," says Luff, S-A's chief technical officer-broadband communications group. "We're out there leading the pack in digital, but reality's reality." Lack of digital standards and interactive content are the biggest parts of that reality. "The economic analysis just doesn't make that a credible effort other than one or two high-visibility trials."

For cable MSOs, reality is that rates still are regulated and competition isn't coming—it's here, in the form of direct broadcast satellite, among other interlopers. That means new services must be here as well, fueling demand for analog boxes with some digital components to enable near video on demand, interactive program guides and virtual channels, as well as other service enhancements.

MSOs must "upgrade incrementally," says Vern Mackall, senior analyst at Northern Business Information. "They're highly leveraged. They're trying to figure out how you're going to get payback on stuff."

New capabilities are important because operators must find new revenue sources, says Time Warner spokesperson Mike Luftman. "We operate in a regulated environment," he says. "For us to be able to grow our business, we've got to be able to provide new services that customers want to pay for in the unregulated part of the line-up."

For Continental Cablevision, the issue relates more to competition. "We're doing it not primarily as a revenue tool but as a competitive tool," says Kevin Casey, vice president-engineering and technology. For example, Continental's priority as it began deploying the first of "several hundred thousand" advanced analog boxes in New England: program guides such as those already available on DBS systems.

Continental has yet to launch virtual channels commercially, and "it's still too early to tell" what services will prove most appealing. These channels still are text-only but will feature graphics as soon as software enhancements are delivered. "I think the best thing at least in the short term they can provide would be information" such as classified ads, movie listings, weather, traffic and sports, says Casey.

That information could get pretty slick—and could aid MSOs further in their efforts to build strong bonds with customers. Software now being developed could let subscribers provide a profile that would be used to send customized information—lunch menus at your kids' school, stock reports on selected companies, scores for your college alma mater's football team. Luff says S-A will create authoring systems and MSOs will lease databases and extract the relevant information, which would go into subscriber mailboxes for delivery on virtual channels to individual set-tops.

Localizing (not to mention personalizing) information delivery would give cable carriers a clear edge over DBS and could save money by avoiding churn. Luff notes the cable industry's 30% churn rate could go to 50% once competition from telcos emerges. A truck roll to start up service costs at least $25 and possibly closer to $50. "That truck roll can wipe out most of the profit from that address for the year," Luff says.

But though Continental plans to offer customized information services, Casey says, "We're talking at least a year" before commercial availability. He points out that MSOs face challenges on the set-top's back end as well. "The delivery infrastructure for an information provider for the virtual channels is pretty cumbersome right now," he says. To serve a million-customer market, an MSO might have to interconnect 40 headends and set up an intermediate server to distribute content to the headends.

With all this added functionality in advanced analog boxes, the only market reason left for going digital would be additional channel capacity. But guess what? With MSOs just now upgrading to 750MHz systems and their 100-plus-channel capacity, there's still plenty of room on any analog system. "There is not a particular need to go digital right now for the core cable business," says Time Warner's Luftman.

WE SEE SIGNIFICANT, SIGNIFICANT QUANTITIES OF ANALOG PRODUCT, CERTAINLY FOR THE NEXT FIVE TO SEVEN YEARS.

PRODUCTS

S-A has 1 million hybrid analog/digital boxes in the field. Its model 8600^{X} features digital memory and microprocessors; video and audio are analog, everything else digital.

The 8600^{X} also features a "genius card," which Luff describes as smarter than a smart card, which is limited to renewable security. The genius card allows for more memory and will enable better graphics, to "future-proof the box." Also available for future applications: a more secure microprocessor and greater memory for applications such as home banking.

The 8600^{X} is designed for adaptation to full MPEG, featuring interface jacks for a future MPEG adapter unit. Generations to follow will include the analog tuner and descrambler as well as the genius card, but the MPEG adapter unit will be built into the box. Altogether this third-generation model will differ only about 10% from first-generation 8600^{X}, Luff says. "It's a very graceful migration up the functionality and digital curve."

Similarly, General Instrument sees a gentle incline, not a steep cliff. "Our vision has pretty much been unchanged for the last couple of years," says Dario Santana, GI's director-analog addressable systems. "We see it as an evolution from analog to digital rather than a revolution."

GI's CFT 2200 advanced analog box "exemplifies that," Santana says. It's an analog box with digital modules that can be added for different levels of functionality. As in S-A's version, all video signals are analog, but there's "a lot of digital processing going on." GI has shipped about 200,000 of the boxes, primarily to Continental and Time Warner.

The CFT 2200 costs $140 to $225, depending on how many modules and how much memory the customer wants. Each data processing module adds $45-$50 cost, and upgrading memory (to 2 Mb) can cost another $15-$20. The terminal can do digital audio, and the processor can handle as much as 16 Mb for customized high-functionality units, according to Santana.

WAITING FOR DIGITAL

Like the others, Santana sees an analog world all around him. "We see significant, significant quantities of analog product" dominating the market "certainly for the next five to seven years," he says. But within two to three years, he expects to see some growth in digital; GI plans to begin shipping digital product by yearend 1995.

Luftman envisions a similar timetable. Time Warner plans to start by rebuilding networks with hybrid fiber/coax and adding analog addressable boxes to grow its core cable business, all while starting to get into telephony and high-speed access for home computers. Then, "by the time we have gone through the process of rolling all those services out to our customers," it'll be time for digital interactive boxes. Luftman expects these first phases to take place over the next three years or so, after which major rollouts of digital interactive will begin.

That's all timed pretty neatly. It remains to be seen whether the market cooperates. Meanwhile, the era of advanced analog is just beginning, and it should be the hot seller for at least a couple more years. ■

MARKET ANALYSIS

FRAME RELAY SERVICE STARTS PAYING OFF

New applications could send revenue soaring beyond sellers' expectations.

Vince Vittore
Associate Editor

Frame relay is booming, no doubt about it. According to some estimates, worldwide revenue from frame relay services will top $1 billion next year and $2 billion in 1997.

However, even those estimates could be considered conservative.

For those vendors already in the market, frame relay makes sense to users as a replacement for leased lines, and it doesn't require a whole lot of new technology to implement.

END POINT - The frame relay market is "exploding," says one expert. End users are seeing large savings, and carriers aren't seeing a drop-off in leased line business.

"Frame relay is saving people a ton of money. There's nothing sexy about the technology, though. Frame relay is X.25 on steroids," says Bob Machlin, vice president-marketing for Cascade, which shares about 75% of the frame relay network equipment market with Newbridge Networks and StrataCom.

"The market is exploding right now," says Andrew Greenfield, president of the Frame Relay Forum. "It will be $700 million in revenue this year. We think we're just at the early stage. We're at the beginning of the adoption curve."

Most users currently are saving on costs by replacing leased lines with frame relay services. However, that doesn't necessarily mean leased line revenue is dropping, something many carriers—RBOCs in particular—feared when the service was introduced in the early 1990s. "The carriers had the challenge of not cannibalizing their own revenue," says Rod Gross, frame relay group marketing manager for StrataCom.

But as the service was picked up by those with little market share in leased lines (LDDS, MCI, Sprint and other IXCs), LECs often found the demand so great that earlier fears proved unfounded, he adds. "They quickly found the overwhelming inherent advantages outweighed the revenue loss, if there was any. Their biggest challenge was keeping up with demand. At the same time, they didn't see a drop-off in their leased line business."

RBOCS SHUT OUT?

"It depends on the particular local exchange carrier. U S West certainly hasn't shied away from it at all," says Jeff Walker, director-marketing/multimedia and router group with Motorola's Information Systems Group. "Their business unit has been charted to go after [frame relay] business. Basically, it's an unregulated business and they are not concerned with what the impact on their regu-

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FRAME RELAY

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lated side is going to be. Other carriers are seeing that it's inevitable."

Leased lines aside, Bellcore's preference for switched multimegabit data service (SMDS) also made it difficult for RBOCs to jump on frame relay, says Machlin.

"It used to be a frame relay-versus-SMDS was an RBOC-versus-everyone else issue. As deregulation hits, a lot of folks now have independent thinking. U S West believes end users are going to push for frame relay, and they don't even offer SMDS. I'd match them up against any IXC. They're as hungry and aggressive as anyone."

Regardless of who provides the service, all seem to agree frame relay is ready for the next step in its evolution—extending the network to branch offices and smaller users. "The people we are trying to get into the market are the ones outside of the Fortune 1000," says Greenfield.

For current frame relay, providers will concentrate on bringing service to branch offices, says Machlin. "Cisco reported 80% of their revenue is routers, and out of 100% of their router business, 53% of the revenue is access routers.

"The average price of the [access router] is $2000. The average price of their big 7000 box is $100,000. Which means you sell 50 times more little popcorn boxes. The net of it is frame relay's next big opportunity is doing the same thing they're doing with leased lines—going to the branch offices."

VOICE EMERGES

As frame relay networks are extended, most proponents want to bring on other applications including SNA traffic and voice.

But before providers put SNA on frame relay, several issues must be resolved, particularly guaranteed response time. "That's the next big issue," says Machlin. "Then there's reliability and management."

The case for voice over frame relay already is being made. Despite the perception that voice is incompatible with frame-based networks, a number of vendors and users are proving that "truism" false. In the last two months since the Frame Relay Forum ratified voice services, the market has experienced a flood of new products that map voice traffic onto public and private frame relay networks (*see page 54*).

REDUCING BILLS

For users, the road leads back to cost savings. "If someone has a frame relay port and a couple of DLC interfaces and they're sending data through, they don't have to pay for the voice calls going over the public network," says Motorola's Walker. "They can save a significant amount on their branch communications."

IT USED TO BE A FRAME RELAY-VERSUS-SMDS WAS AN RBOC-VERSUS-EVERYONE ELSE ISSUE. AS DEREGULATION HITS, A LOT OF FOLKS NOW HAVE INDEPENDENT THINKING. U S WEST BELIEVES END USERS ARE GOING TO PUSH FOR FRAME RELAY, AND THEY DON'T EVEN OFFER SMDS.

Getting voice onto frame relay centers around compression and quality. Vendors' current offerings squeeze voice into an 8 kb or 16 kb signal.

Some also are adding silence suppression techniques similar to those used in the ATM world, further reducing required bandwidth.

"The key is if you can take a standard frame relay voice interface and put it over a standard frame relay network," Walker says. "It has to be a very good voice implementation, or the customers aren't going to put voice over public frame relay."

Even so, some claim voice over public frame relay will be limited to local networks.

"In much of the United States with the core backbone, it doesn't make any sense," says Machlin, adding Cascade and Motorola just finished testing voice over frame relay and found the quality very good.

"If you're an end user, you can go to AT&T, MCI and Sprint and spend two to six cents a minute for voice. The chances of you getting the same economy on frame relay are pretty low."

However, plenty of smaller networks in the last mile provide users those same economics, he adds. "If you prove that you can get good-quality voice over that same data infrastructure, why wouldn't you do it?"

Beyond voice, some also are looking to video and Internet access. PictureTel and several software companies are experimenting with desktop video conferencing over frame relay, says Machlin. "People justified their TDM networks with voice, and data rode free. Frame relay is the reverse. You justify your frame relay networks with data. Now they're starting to ride voice and video free."

Throwing Internet into the equation could make even more sense, he adds, because it already basically is a frame relay network. "Most of it is hype right now, but voice and fax over the Internet are going to be very viable services. It really cuts the cost of the service provider because it's distance insensitive."

Regardless of who provides the service, everyone seems to agree frame relay will continue its explosion over the next few years.

For carriers, the question seems to be how much revenue the service will generate and at what expense.

"Thus far, all of the carriers have basically been order takers for frame relay," says Machlin. "In some cases it's incremental revenue, and in some cases it's cannibalistic. What they want to do is not get into a zero-sum game. In the short term, there are going to be some cannibalization worries. In the long term, it's definitely growing." ■

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■ PEOPLE

THE EVANGELIST OF FRAME RELAY

All technologies have their support groups and forums to provide a driving force in the marketplace. But few have promoters like Richard Moley, president, CEO and chairman of StrataCom and a self-described frame relay evangelist. *America's Network* recently interviewed Moley, who offered his views on an expanding market in which he has been involved deeply since the beginning.

EVANGELIST - Richard Maley has been preaching the advantages of cell switching since 1986. After several years of turning a deaf ear, carriers started listening.

Why did frame relay service take so long to catch on in the market?
In '86 when we started, we actually were promoting cell switching.

I've been an evangelist for cell switching since 1986. Until the late '80s, there was no convention or LAN product to address the wide area network and direct where the information was to go. So we created the Frame Relay Forum along with Cisco, Northern Telecom and DEC sometime in late '89.

Then we went to the carriers and said, "Here's an opportunity to provide this service to carry this frame relay traffic across the networks, and this is an alternative to your private line services." The entrenched carriers that had a lot of the private line infrastructure weren't terribly motivated to do this.

When did they change their thinking?
Thank goodness for competitive markets. We scored first with WilTel. We went to them, and after a few months they gave it a try because they only had 1 or 2% of the private lines.

Ironically, that opened accounts for them that weren't previously interested in them, and they actually increased their sales of private line services. In the space of six months, it went from a single carrier providing frame relay service to four major carriers announcing they would support frame relay.

This business grew nicely but not explosively. WilTel was doing well, but let's face it, WilTel only has so many salespeople on the street. The fact that AT&T embraced it with 70% of the private lines, that brought much more of an explosion.

In all those situations, though, you have a competitive environment. What took the LECs so long?
They were later than the IXCs for perhaps two reasons. Their environment isn't quite as competitive—to be polite. They didn't have to react to somebody creating a major threat. Secondly, early on they were really promoting SMDS, and that really slowed down adoption within the RBOCs. But in the last 12 months, most RBOCs have deployed or are in the process of deploying frame relay services because their customers really want it.

Also with legislation in Congress, there's a reasonable expectation that before too very long, they'll be allowed into interexchange and interexchange into local. So it makes sense to satisfy that customer demand before somebody else gets in and satisfies it. Most of them now are just as enthusiastic and aggressive about frame relay as the interexchange carriers.

Is frame relay just a stopping ground until carriers deploy end-to-end ATM networks?
Some people are still a bit confused that somehow ATM and frame compete with one another. There's a few hundred ATM boxes out there that are carrying real live traffic. So you have 99.9% of equipment that's frame based. There's no particular reason to put expensive equipment in the premises to chop those frames into cells. The network should do that. And vice versa: If you have a piece of ATM equipment, you want an ATM service. They're only competing in the sense that over time more and more of the premises equipment is manufactured to be ATM-like. And then there's more and more demand for cell services. At some point, there'll be more replacement of

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DIGITAL SERVICE BLUES?

By Linda Hathorn

CUSTOMERS & PROVIDERS CAUGHT IN A STRANGE NEW GAME OF CHANCE.

Telephone companies, MIS managers, OSP technicians and CO personnel are playing a high stakes game of chance with the end users data-type services. Without proper test equipment, technicians are forced to play Russian roulette with a customer's data integrity. Not that big a deal, you think to yourself.

Every day the odds jump exponentially that a technician will clip onto a line that is transmitting data during a normal day's activities of calling dispatch, the CO, the service office or just probing around looking for tone.

LET'S UP THE ANTE WITH SOME SPECIFIC SCENARIOS.

A single technician accidentally clips onto a data line with a piece of test equipment and interrupts service in areas where T-1, Switch 56, or other digital services are provided. How many of those 24 different customers would you guess were transmitting payroll information, or sending electronic mail or graphic files from one place to another?

If there's no automatic reset, the interrupted data stream results in customer complaints. Guess who gets a phone call from an upset customer? You're sorry they were right in the middle of inventory. Or transmitting financial transactions. Or on-line with their new customer in Ponggol, Singapore.

When downed service results on a high-speed Sub Rate Digital Loop (SRDL) line, it can impact automatic teller machines, debit machines, pay-at-the-pump machines. And interrupt all the transactions involved. Now you've got multiple groups of upset people all pointing at you, the service provider.

Other common technician activities that can, and often do, interrupt data streams include accidentally going off-hook on an untagged digital line when attempting to locate a new cable pair for a customer or searching for dial tone at a B-box. It also happens to CO personnel who test and verify cable pairs for new installs or when dealing with maintenance issues. The list goes on—as does the number of data interruptions, downed lines and frustrated customers. And all along you're seeing NTF (no trouble found) on your data reports.

> "Now you've got multiple groups of upset people all pointing at you, the Service Provider..."

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Linda Hathorn is the Product Marketing Manager for Portable Test Equipment at Harris Corporation.

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MOLEY

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frame-based equipment, and eventually most of the traffic will be cell based. But that's going to take many years for that transition.

The other factor is ATM doesn't have pervasive reach. ATM only initially is going into corporate data centers and corporate headquarters with very high performance requirements. When you equip your corporate data center with ATM, you would like to spit data out at high speed and deliver it at low speed to your branch offices. ATM and frame service interworking is absolutely crucial to the success of both frame service and ATM.

BECAUSE OF THAT COST ISSUE, INITIALLY WE'LL SEE MORE TRAFFIC GOING OVER THAT ATM CLOUD THAN GOING OVER DEDICATED PIPES.

And that's where the RBOCs will come into play?

We've been preaching this for a long time, but nobody was really listening. It wasn't a real issue because there wasn't much ATM equipment. Now, as companies like Intel start deploying ATM, there's going to be demand.

The other factor is in order to take ATM cells, you have to have a cell fabric to move those cells around. If cell fabrics have to be justified only on the basis of ATM service revenue, it's going to be a very "lossy" business for quite some time. To have a pervasive ATM network, you have to catch traffic from lots of customers who may have data centers in many different places. So ironically, frame helps justify the ATM fabric.

The other thing we've preached for years is the way to carry frames across the network isn't by carrying frames and using a frame switch. The solution is to chop everything into cells. As you have billions of dollars of frame traffic, that drives the demand for the ATM broadband layer to carry all this traffic. Having that in place justifies frame service. All you have to do to provide ATM service is put an ATM interface into your existing fabric.

When does voice service come into play?

It's already going. There's a difference between corporate voice, where it's predictable and you know where it's going and it can be carried on TIE lines. That's a simple application because it's not millions of consumers picking up telephones, dialing numbers and getting switched across the globe. What will take some time to happen is that kind of traffic to be in ATM mode. I think that will happen in two phases.

The first phase will be the conventional Class 5 offices, but instead of having dedicated bandwidth, [voice traffic] can flow over the ATM fabric. At some point, they won't buy any more of those [Class 5 switches] because it will be ATM-oriented equipment and will be able to take phone calls directly. My guess is that over the next few years, you'll see the first phase, but it will be 5 to 10 years before you see native ATM telephones and that kind of stuff. I think CO switches eventually will be ATM switches. What we're talking about is a revolution that is very profound.

Was it a mistake to position frame relay as a cannibal of leased line revenue?

Over the long haul, it's inevitable. In the short run, the new demand is going on frame relay and people are leaving the existing infrastructure in place because they're challenged enough to put the new stuff up.

Private line is still growing, but at some point that will change. SNA, for example, is not a high-growth application, but it's absolutely enormous because all of the giant transaction networks all run SNA over leased lines. Now SNA is coming up on to frame relay. Given that it doesn't have a very high-growth profile, one suspects as SNA comes on in substantial quantities that will be more of a switching from private lines.

Is it going to be over a public or private network?

I think we'll see a mix. Interestingly enough, our initial model of a private ATM network was flawed. We thought it would follow the private T1 market. The problem is the step up from T1 to T3 is so big that so few corporations have the need for that yet.

In addition, if you're putting everything down a T3 pipe, you need a backup. So you're not talking about one T3, you're talking about two T3s, and that's very expensive. Because of that cost issue, initially we'll see more traffic going over that ATM cloud than going over dedicated pipes. As it matures, we'll see a mix of fixed facilities and the cloud. Private networks may not look the same, and it's going to be tough to tell what's private and what's public.

StrataCom has been successful selling to the interexchange carriers but not the RBOCs. Why the disparity?

In interexchange carriers we're very strong, and that's about 60% of our business worldwide. We're trying very hard with the RBOCs. We finally realized that the RBOCs are not only large buyers of equipment, but they have special requirements and they needed to have a special sales force. We put together a sales organization just over a year ago to focus on this. We're now on trial with a number of RBOCs, and we're hopeful we'll get our first RBOC contract in the next three to six months.

There's a melting pot taking place where we've adjusted and recognized we need to pay serious attention to their requirements. They're adjusting and recognizing that they're going to move more toward the interexchange model. They've been willing to take our equipment and test it, and they respect what we've done with the interexchange carriers. ■

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■ NEW SERVICES

LDDS RIDES ITS DATA WORKHORSE TO THE NEXT LEVEL

CERTIFICATION LABORATORY - At WorldCom's Enterprise Networking Data Lab, the carrier conducts its frame relay and ATM customer premises equipment (CPE) certification.

Mark Dziatkiewicz
Technology Editor

Frame relay isn't as flashy as asynchronous transfer mode (ATM), but it's become a premier data service by meeting customers' networking requirements. That description also could apply to WilTel—now LDDS WorldCom—a data communications pioneer and the first to offer frame relay over the public network.

Though the world seems transfixed by ATM as "the" future service and transport technology, frame relay's the real developing data workhorse. And that scenario won't change anytime soon, according to David Natho, WorldCom product manager-frame relay. "You'll see frame relay for a very long time."

It's not a surprising revelation. Frame relay offers a bandwidth range and service capability customers require. And where application limitations exist, frame relay serves as an ideal ATM transition technology.

"We view frame relay and ATM as complementary technologies," he adds.

While it lacks ATM's splash and dash, frame relay technology and services reflect years of development standards. "Frame relay originated from the broadband ISDN standard. It's the digital version of X.25," continues Natho.

As an X.25 extension, frame relay is the "next-generation" packet-based technology. It uses variable-length frames—to ATM's fixed-length cells—transporting customer traffic through the network.

"Frame relay is really not a transport but an interface standard," he explains. "The customer gives us variable-length frames and we take them and transport them any way we wish." This differs from ATM, which specifies both the interface and transport.

WorldCom transports its frame relay service via cells. "We really sell frame cell service," continues Natho. "We take the variable frames and chip them into fixed-length cells. The cells are transported between switches, and at the other end we give back the customer a variable-length frame."

Frame relay customers also receive service flexibility and considerable network efficiency. "What's driving frame relay is customers with several locations," he adds. "Customers take advantage of dynamic bandwidth capability, better reliability and availability."

Although he says there's no typical customer, company size or application, frame relay's a service enabler.

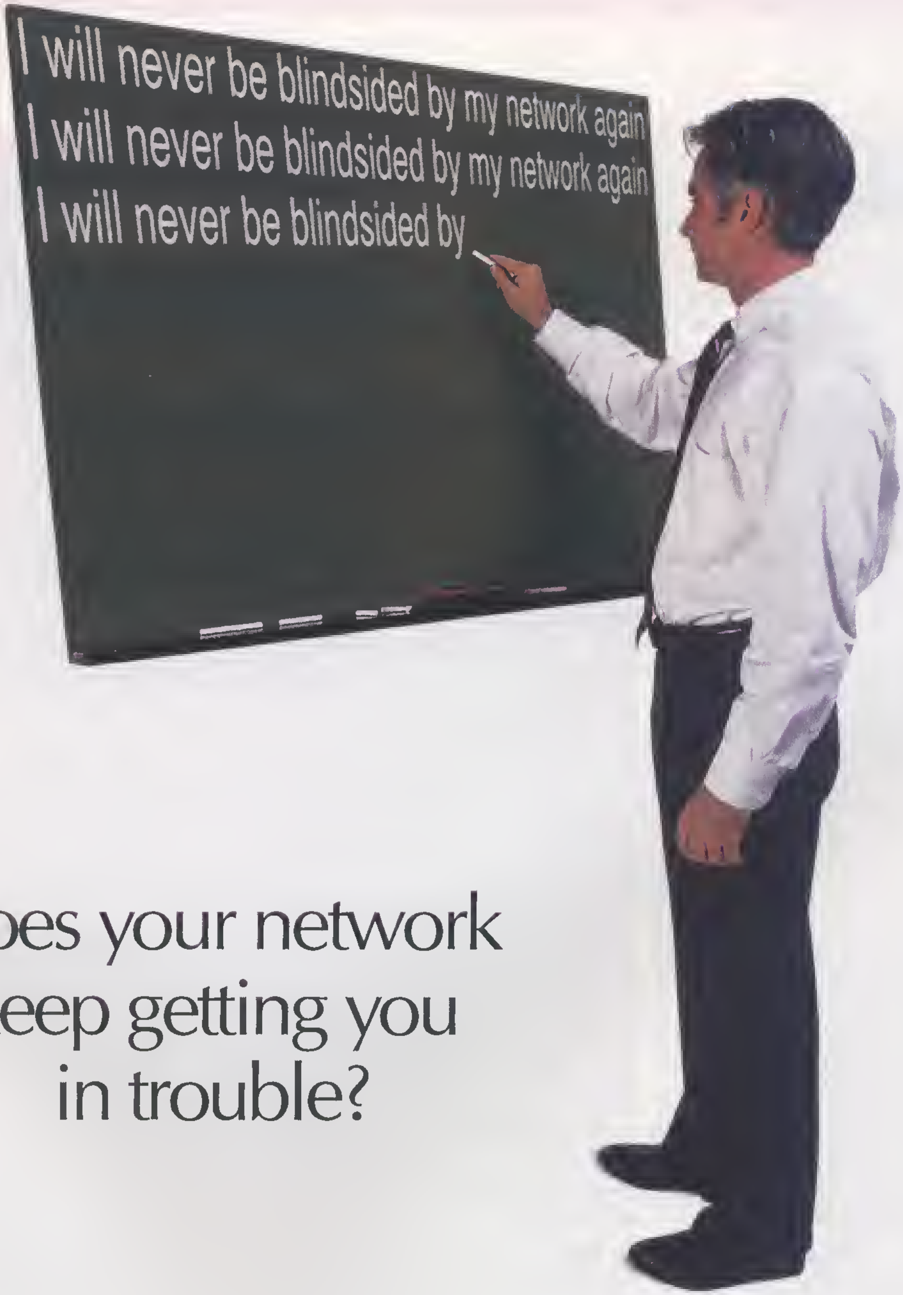
"A frame relay customer may be operating a private line network for their SNA applications and another private line network for their LAN traffic," he explains. By moving to frame relay, "customers can consolidate network management efforts and save local access and interexchange costs. It's a platform that allows them to change configurations because the network is software defined."

FIRST IN

Having introduced the first public frame relay service in 1991, WorldCom's service offering's flexibility correlates directly with its popularity. Customers value reducing networking costs, improving reliability and simplifying network design and management. WorldCom considers all of the above its market strengths. "Our niche was data because we wanted to be the data communications provider for business," says WorldCom spokesperson Linda Laughlin.

Service innovation is ongoing. Consistent with a "what have you done for me lately?" customer attitude, WorldCom

continued on page **52**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LDDS

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continues to migrate and expand its service offerings.

"When we first introduced [frame relay], we had to educate customers," says Natho. "Today they come to us and know we're one of the premier service providers. But on a going-forward basis, they know frame relay works and they ask us, 'What else can you do for us?'" WorldCom's Data Concourse demonstrates its philosophy and network service response.

The company's frame relay offering operates within its Data Concourse broadband network platform, which accommodates frame relay and ATM. It provides several important and innovative customer features, including a network-to-network interconnection (NNI) option allowing distinct frame relay network interconnections.

"With NNI, we can make a connection between two different frame relay clouds," explains Emily Hansen, product manager-NNI. That could entail frame relay networks in two different LEC service areas, with WorldCom providing the interexchange link or a combination of local and interexchange applications. But it's the connection type that's unique.

Most interexchange carriers provide frame relay through private line access connections, bypassing local exchange carrier frame relay networks. WorldCom provides customers its NNI option to connect directly through their LEC.

"The customer connects to the LEC network and then specifies that they want to connect to our cloud via LEC frame relay," explains Hansen. "The customer connects to his LEC frame relay network—and other sites in the same LATA—and also expands their network to include our coverage. We're the only IXC that has nationwide NNI service established with all the major local exchange companies."

SAVINGS, SAVINGS, SAVINGS

The network distinction is significant and so are potential savings.

"We eliminate the need for the customer to have duplicate access and equipment," she says. "In addition, it allows them to look at their network and select the best and the most cost-effective solutions. The customer can do a hybrid solution and save from 24%-50% over a traditional frame relay solution."

A hybrid solution selects network components from local and interexchange carriers, depending on cost and reach requirements.

For example, an interexchange carrier's network may not be optimized for frame relay transport across town. "Our longest PVC could go 3000 miles. When you're a local exchange company, the network is much smaller and your costs are less," she continues.

Through WorldCom's Data Concourse, customers use local frame relay service when it makes sense.

"A customer may have five locations in San Francisco and five in New York," Hansen says. "If there's a need in the LATA, the best solution may be with the local exchange carrier. We allow them to choose the most economical frame relay to

---

READY FOR TAKEOFF

SPRINT, EDS UNVEIL FRAME RELAY NETWORK FOR TRAVEL AGENCIES

Vince Vittore
Associate Editor

While many carriers are rushing to be first in the broadband network market, Sprint can lay claim to one of the world's largest frame relay networks to date.

When completed, MAXSys Net will serve System One and its network of more than 7500 travel agencies. Currently used by travel agents to access reservation system databases for airlines and hotels, the network will be converted to frame relay, with about 8000 end points.

Earlier this year, System One Amadeus National Marketing announced its intent to convert MAXSys from Airline Link Control technology to frame relay for increased speed and flexibility. The company, partially owned by EDS, chose Sprint to provide frame relay service, using Fastcom access devices and Cisco routers. Fastcom also will develop custom software for the network.

"The choice of frame relay is a cost-driven decision," says Ed Bursk, vice president-marketing for Fastcom, adding System One will be billed at a flat rate. "If they have more traffic from a particular agency or at a particular time of the year, they don't have to pay for the extra traffic.

"The thing people like about the flat-rate pricing is they can budget it," he continues. "It's kind of like your gas bill. If you can stretch it out over the year, you don't get a big surprise in the winter."

In addition to accessing travel-related databases, agents also will be able to explore the Internet for travel resources. Though initial network endpoints will reside in the U.S., if the owners want to expand internationally, frame relay is being implemented in a similar manner throughout Europe, according to Bursk. "In Europe, it's very similar, but there are minor differences like link management. Fortunately, it's pretty much under control with the vendors. We certainly hope it will continue to grow." ■

meet their needs. If they choose the LEC frame relay, they're not locked out of moving outside the LATA."

WorldCom has strong business and partnering relationships with most large LECs, according to Hansen. And in spite of RBOC desires to move beyond the local loop, she believes those ties will strengthen.

"We strengthen their position because customers get an additional benefit of getting outside the LATA," Hansen continues. "Even as they're [RBOCs] developing plans and trying to stretch their wings, they're developing relationships with us. We eliminate the need for RBOCs to have relationships with other LECs locally and internationally."

BY MOVING TO FRAME RELAY, CUSTOMERS CAN CONSOLIDATE NETWORK MANAGEMENT EFFORTS AND SAVE LOCAL ACCESS AND INTEREXCHANGE COSTS. IT'S A PLATFORM THAT ALLOWS THEM TO CHANGE CONFIGURATIONS.

In addition to providing service flexibility, WorldCom's Data Concourse plays heavily in its ATM strategy. Frame relay-to-ATM interworking, available early next year, allows customers to choose broadband solutions that meet network site needs on a location-by-location basis.

"The Data Concourse gives customers the ability to migrate seamlessly and painlessly to ATM," explains Natho. "We do all protocol conversion for the customer. It's based on the customer's need for specified applications or bandwidth at the location."

Customers can deploy ATM to sites with major data requirements while retaining frame relay at satellite locations. Sites can be upgraded or downgraded as needed. The Data Concourse provides the flexibility.

"If I've got 10 frame relay locations and three ATM locations and I want them to talk together, we do all the protocol conversion," explains Natho. "That's the level of complexity the customer wants."

And moving up to ATM becomes an application or bandwidth requirement rather than technology choice. "Conceptually, that's the vision we've had for the last several years and are moving towards," adds Chuck Poston, product manager-broadband services. "When you have the necessary [ATM] scenarios, you try to let the customer make a decision on a basis other than technology."

Helping them make right decisions is part of what WorldCom sells—along with a wealth of service options. And in spite of ATM's allure, WorldCom keeps innovating frame relay options. It's extending frame relay's reach by providing ISDN and Switched-56 access in addition to asynchronous dial-up.

Asynchronous dial-up is particularly important because it could draw considerable interest from mobile data users. Customers dial into WorldCom's frame relay cloud instead of accessing individual corporate data sources.

"If that person's sitting in a hotel room and needs to pull [data] from four or five different locations, once you're in that cloud, you can pull from all the locations," explains Natho. "You're getting the capacity to handle a greater number of calls. Most customers don't want to have the responsibility to maintain a modem rack."

If there's a pattern to LDDS WorldCom's thinking and resulting services, it's keeping close to customers, anticipating needs and providing solutions. That's been key to WilTel's success since its 1985 inception.

It's come a long way from oil and gas pipeline, facilities-based "carrier's carrier" days, but as WilTel or WorldCom, the commitment's been the same—imaginative and innovative data services without the hype. ■

LDDS CHRONOLOGY

1985

Begins operations as Williams Telecommunications Co., building fiber optic facilities in decommissioned petroleum pipelines.

1986

WilTel spins off from Williams Pipe Line Co. as a separate operating company.

1987

Along with NTN-members (National Telecommunications Network), drives ceremonial glass spike to mark coast-to-coast fiber optic network completion.
Combines with LDX Net to form Williams Telecommunications Group.

1988

Acquires 400-mile RCI network.

1989

Acquires Houston Network Inc.; acquires Litenet.

1990

Introduces industry's first fractional T3 service.

1991

Acquires Centel Communications Systems;
first IXC to turn up fast packet frame relay service;
acquires Telesphere Communications.

1993

Introduces ATM service.

1995

LDDS acquires WilTel Network Services.

HOT PRODUCTS

VOICE TRAFFIC GROWS

Vince Vittore
Associate Editor

For most carriers and manufacturers, sending voice over frame relay is one of the hottest topics around. For ACT Networks, it's old hat.

"Vertical Systems just came out with numbers that said we had 4.1% of the frame market. That says voice is at least that [much], because that's all we do," says Ross Kocen, director-product marketing at ACT and chairperson of the Frame Relay Forum's Voice Over Frame Relay sub-working group. "Our own numbers say voice accounts for about 8% of the frame relay traffic."

ACT's latest development: a series of frame relay access devices (FRADs) that lets users combine data, voice and fax traffic over frame relay networks.

The FRADs, which have been certified for use in MCI's HyperStream frame relay network, use Adaptive Code Excited Linear Prediction (ACELP) compression to bring the 64 kbps voice channel down to 8 kbps. The voice then is chopped up and encapsulated into variable-length frames and shipped across the wide area network.

Each FRAD includes a universal voice card designed to handle any type of signaling from PBXs, says Kocen. "In the analog world, there is lots of different signaling. One of the things that's unique with our card is we can do [a kind of] signaling conversion. Any number of nodes in the network can be like a single handset plugged right into a two-wire interface right into our unit. At the central site, we could have a PBX connected with something different. We have hooked up to just about every PBX known to man."

This is particularly important as the number of end point types in the frame relay network grows, he adds. "Networks usually are in transition."

Eventually, Kocen expects the market to be flooded with ATM voice products. As chairman of the voice subcommittee, he recently opened up liaison with the ATM Forum's voice subcommittee.

"We want to work closely with each other so that when the smoke clears, there will be a very good chance of interoperability between frame relay and ATM. We've started that process, but we still have a long way to go." ■

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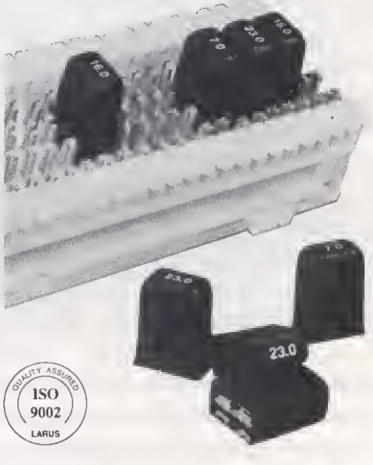

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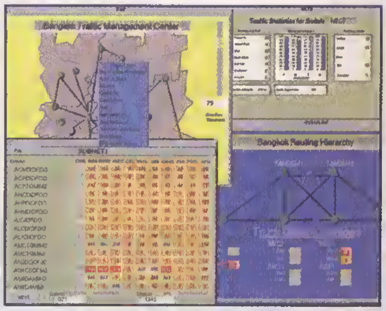
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HOT PRODUCTS

MEMOTEC BREAKING DOWN VOICE 'MYTH'

Vince Vittore
Associate Editor

Breaking down a myth is no easy task. And when it comes to sending voice over frame relay, myths can be especially tough nuts to crack.

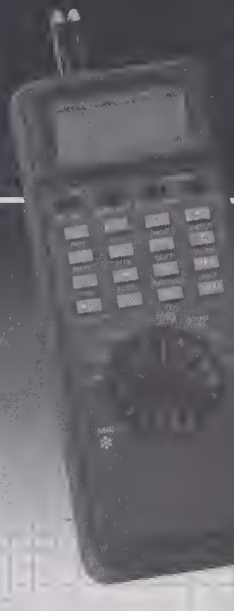
"There's a firm belief by some people that the technology is not viable," says J. David Ball, vice president-research and development and chief technical officer of Memotec, which recently unveiled its Thunderbolt products featuring voice over frame relay. The Thunderbolt line includes four products ranging from an entry-level single-user FRAD to a multimedia access switch.

At the low end is a FRAD—the FR 870—that lets users combine voice and data over frame relay networks. The companion FR 970 is a small switch with optional Ethernet interface, making it well suited to branch office applications that need to transport legacy and LAN traffic.

At the other end is the CL 2500, a standalone branch office multi-protocol bridge/router, and the flagship CX 1000, a multimedia access switch. The CL 2500 is designed for applications requiring access to network resources such as e-mail, file transfers and interactive terminal traffic.

In all products, Ball says, the company has implemented a voice module, which uses ACELP compression to send voice traffic over frame relay networks. And despite general skepticism about voice over frame relay, the idea is winning converts quickly. "In a demonstration situation, if you get it in the door, they buy it," he says.

One of the first users is Medical Transcription Corp. (MTC), which provides outsourced transcription services for hospitals, clinics and doctors throughout the Northeast. Before adopting voice over frame relay, the company used separate lines for voice and data. By using a CX 1000 and 56 kb lines at three locations, the company cut its total communications bill by 50%. Additionally, MTC now can share information among a variety of workstations, which lets the company route work to free terminals more efficiently. ■



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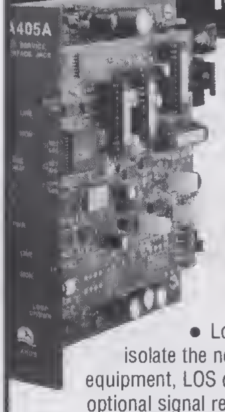

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PCS INFRASTRUCTURE

BILLION-DOLLAR BUILDOUTS

Nortel will have to race to stay in the CDMA game with AT&T Network Systems and Motorola. Sprint's decision may be crucial.

Eric Krapf
Managing Editor

For either AT&T Network Systems or Motorola, the Sprint coalition's infrastructure contract could seal a claim as a dominant PCS CDMA vendor. For Nortel, a piece of the Sprint contract may be essential just to establish itself as a major CDMA player.

AT&T Network Systems already shares contracts for the other two national PCS buildouts: AT&T Wireless (naturally) and PCS PrimeCo. The latter may have turned the tide in the PCS infrastructure battles when it opted for code division multiple access (CDMA) air interface over GSM for its billion-dollar buildout. AT&T Network Systems, a strong CDMA backer, shuns North American GSM, while rival Nortel provides both technologies—though all its major U.S. contracts were GSM at the time Sprint was making its decision.

Meanwhile, Motorola shares the PrimeCo buildout and captured the third-biggest CDMA contract—an estimated $800 million deal with GTE, which Motorola shares with switching partner DSC. AT&T Wireless is building a time division multiple access (TDMA) system, some of which is contracted with Ericsson.

In the competition for what's expected to be the biggest PCS buildout of all, Nortel has some important advantages, not the least of which is the fact that A, T and T are not exactly Sprint's three favorite letters. Nortel has close ties to Sprint as its exclusive provider for long distance switching and one of several local-loop vendors. It's also worked with other Sprint coalition members.

"We feel like we have a strong relationship with them, and hopefully that relationship will result in us winning a share of that business," says Nortel spokesman Mark Buford.

Which is not to say Nortel, Motorola and AT&T all can't come up winners. Like PrimeCo, Sprint expects to split its contract (which had not been awarded at *America's Network*'s press time) among multiple vendors.

NORTEL NEEDS A WIN

But the stakes are highest for Nortel, says Mark Lowenstein, research director-wireless and mobile communications for The Yankee Group consultancy. "Nortel desperately needs some of the Sprint contract in order to lend some credibility" to its CDMA efforts, he says.

Lowenstein also sees a difference between Sprint and PrimeCo, the consortium of three RBOC cellular units and AirTouch. Because Sprint is starting from scratch in building its PCS network, "a massive amount of [the contract decision] will come down to vendor financing," Lowenstein says. Delivery dates will be important as well, no small concern for a technology that's already perceived as lagging behind GSM and TDMA.

Tom Mateer, vice president-strategic development for the Sprint Telecommunications Venture, agrees financing and delivery will be important, and adds one more item: "It's absolutely critical that there be a capability to deliver quality product."

continued on page **60**

MAJOR PCS CONTRACT AWARDS

CDMA	GSM	TDMA
PCS PrimeCo AT&T Network Systems/ Motorola	*BellSouth* Nortel	*AT&T Wireless* AT&T Network Systems/Ericsson
GTE Mobilnet Motorola	*Pacific Bell* Ericsson	
North American Wireless AT&T Network Systems	*Go Communications* Nortel	
Ameritech ?	*American Personal Communications* Ericsson/Nortel	
Sprint Coalition ?	*Western Wireless* Nortel	
	Omnipoint (hybrid GSM-IS-661) Nortel	

Note: Southwestern Bell had not announced its PCS technology choice or vendor at America's Network *press time.*

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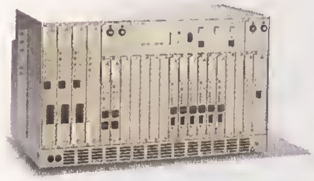

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BUILDOUT

continued from page **58**

Nortel concedes it lost out on the initial PrimeCo contract because Motorola and AT&T Network Systems committed to having hardware three to four months ahead of Nortel's promised date. Price and product were competitive, Buford says, and "it really boiled down to delivery schedule."

Buford insists Nortel still has a shot at grabbing a piece of PrimeCo's business. The consortium has designated Nortel as an approved vendor, meaning it can fill future orders. That's not insignificant, according to Buford.

"Obviously, these guys either directly or indirectly will be bidding on new spectrum," he says. "We're still reasonably confident that we'll yet win some business from them."

EFFICIENCY OVER SPEED

PrimeCo's decision last June to go with CDMA reflected the fact that these big carriers "want efficiency over speed [to market]," says Barry Goodstadt, director-wireless industry consulting, A.T. Kearney & EDS.

Time to market remains important, but may not be the overriding concern: "What market?" says Goodstadt. "There is no market. It doesn't exist yet. This is not something you can roll out very quickly." How long will it take? "Maybe they'll make 24 months."

> "WE COULD'VE EASILY SAID, 'GSM—THAT'S THE WAY YOU WANT TO GO, O.K.'" BUT "IT JUST WASN'T THE RIGHT DECISION FOR THE NORTH AMERICAN MARKET."

The holdup isn't technology, either, according to Goodstadt. Clearing microwave incumbents from spectrum and getting agreements on cell sites is proving harder than anyone thought; those with the spectrum and sites know they've got the PCS providers over a barrel. Local zoning boards likely will be strict as well. "They have to fight local politics; that's tough."

Sprint's Mateer agrees. "There is strong evidence that the microwave community is taking advantage of the FCC's rules and are asking for a significant amount of money to relocate links, far above the actual cost of the relocation," he asserts. "The PCS providers are being taken advantage of."

But vendors dispute Goodstadt's timetable, insisting CDMA services can and must be rolled out in about a year if carriers are to begin recouping their huge investments. (Mateer says Sprint plans to roll out service in select markets by Christmas 1996.)

Operators "haven't been waiting around for their licenses and their technology decisions" before seeking sites and microwave relocation, Buford points out.

"Time to market is still very critical for all the new entrants," agrees Scott Erickson, vice president-marketing for AT&T Network Systems. And he maintains GSM's perception as the quicker time-to-market technology is just that—perception. To improve voice quality, U.S. GSM needs new speech coding, which calls for standards and interoperability testing, he claims. Also, signaling protocols have to be modified for intelligent network services.

Buford concedes GSM technical issues

NICHE SERVICE - Bellcore and its partners are aiming PACS Edge at business and residential users.

PACS PALS

BELLCORE GETS A BOOST

While manufacturers of CDMA and GSM systems chase after fat contracts for nationwide PCS service, Bellcore is aiming its Personal Access Communications System (PACS) technology at a low-mobility niche. And now it has a pair of major players to help.

Bellcore is teaming with Siemens Stromberg-Carlson and Hughes Network Systems to offer PACS Edge, a turnkey solution targeted primarily at Basic Trading Area (BTA) licensees seeking to serve small, high-density areas. The system is best suited for high-usage residential and business users and seeks to "fill the void between the cordless and the cellular applications," says Eve Aretakis, vice president-product line management for Siemens Stromberg-Carlson.

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GSM.

Goodstadt notes GSM's existing deployment makes it a proven technology. "No one knows if CDMA really works when the system's filled. You can't simulate that. You just have to do it."

And though he doesn't challenge AT&T Network Systems and Motorola on their promised delivery dates, Nortel's Buford notes there's precedent with TDMA for availability lagging behind projections.

"They and we are faced with a considerable challenge in delivering CDMA systems in the time frame we're talking about," Buford says. "To deliver new technology and have it commercially available

fundamentally different approaches to carrier customers' air interface decisions. It's not that AT&T doesn't know how to do GSM; Erickson points out his company is building GSM networks in Saudi Arabia, Malaysia and other foreign countries. "We could've easily said, 'GSM—that's the way you want to go, OK.'" But "it just wasn't the right decision for the North American market," where existing cellular networks would migrate to CDMA and full compatibility was essential. "It was not obvious to us that you were going to achieve that any time soon with some of the other air interfaces such as GSM.

"Our view was, building the network on the North American standards was

matter. In the past, Sprint has shown some "initial reluctance" to deal with AT&T, says Lowenstein, but AT&T Network Systems has done a good job of separating its business units.

"Most [customers] seem to have reached a comfort factor," says Lowenstein, noting that PrimeCo's RBOC owners are no chummier with AT&T than Sprint is.

Nortel's contracts with Canadian CDMA cellular carriers—who are seeking PCS licenses from their government—demonstrate its credibility as a CDMA vendor, Buford says. But winning a chunk of the estimated $1 billion-to-$2 billion Sprint contract sure would help eliminate any lingering doubt. ■

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"WE COULD'VE EASILY SAID, 'GSM—THAT'S THE WAY YOU WANT TO GO, O.K.'" BUT "IT JUST WASN'T THE RIGHT DECISION FOR THE NORTH AMERICAN MARKET."

The holdup isn't technology, either, according to Goodstadt. Clearing microwave incumbents from spectrum and getting agreements on cell sites is proving harder than anyone thought; those with the spectrum and sites know they've got the PCS providers over a barrel. Local zoning boards likely will be strict as well. "They have to fight local politics; that's tough."

money to relocate links, far above the actual cost of the relocation," he asserts. "The PCS providers are being taken advantage of."

But vendors dispute Goodstadt's timetable, insisting CDMA services can and must be rolled out in about a year if carriers are to begin recouping their huge investments. (Mateer says Sprint plans to roll out

sions" before seeking sites and microwave relocation, Buford points out.

"Time to market is still very critical for all the new entrants," agrees Scott Erickson, vice president-marketing for AT&T Network Systems. And he maintains GSM's perception as the quicker time-to-market technology is just that—perception. To improve voice quality, U.S. GSM needs new speech coding, which calls for standards and interoperability testing, he claims. Also, signaling protocols have to be modified for intelligent network services.

Buford concedes GSM technical issues

"We're not going head to head with the cellular providers," adds Tsippora F. Dingott, Bellcore's assistant vice president/market manager-personal and wireless communications. She calls the service "cordless mobility."

A TDMA system, PACS is adapted from Bellcore's earlier Wireless Access Communications System (WACS), which included elements of Japan's Personal Handy Phone (*America's Network*, Sept. 1).

PACS features wireline voice quality, and the partners expect PACS Edge will resemble wireline service in another key area: pricing. The service should support enough minutes of use to allow fixed pricing rather than airtime charges, according to Dingott. Another feature: time-slot aggregation allowing Internet access from wireless data terminals. Two time slots will provide a 64 kbps circuit, with aggregation possible for as many as eight time slots, providing a 256 kbps circuit, according to Kal Ganesan, Hughes Network Systems assistant vice president-digital cellular networks.

The partners expect quality and pricing to attract residential users, while businesses may find the service especially useful for in-building or campus applications. A radio port serving a corporate location simply would hand calls off to public radio cells, providing seamless communications for employees moving on and off site, Ganesan explains.

Siemens will provide core switching, AIN capabilities and ISDN access to the radio network subsystem, and PACS Edge will support transparent ISDN and Advanced Intelligent Network (AIN) features. Hughes will supply radio ports, radio port control units and an operation and maintenance center for the radio network. Bellcore will provide software systems including home location register and visiting location register, as well as mobility management elements.

PACS Edge is slated for availability in second quarter 1996.

remain. "Do we think they're worked out? No. Do we think there are solutions? Sure." He concludes, "Your odds of being in service quickly are still greater with a technology that's in use today"—that is, GSM.

Goodstadt notes GSM's existing deployment makes it a proven technology. "No one knows if CDMA really works when the system's filled. You can't simulate that. You just have to do it."

And though he doesn't challenge AT&T Network Systems and Motorola on their promised delivery dates, Nortel's Buford notes there's precedent with TDMA for availability lagging behind projections.

"They and we are faced with a considerable challenge in delivering CDMA systems in the time frame we're talking about," Buford says. "To deliver new technology and have it commercially available in less than a year is an extremely ambitious thing."

VENDOR APPROACHES

AT&T Network Systems and Nortel took fundamentally different approaches to carrier customers' air interface decisions. It's not that AT&T doesn't know how to do GSM; Erickson points out his company is building GSM networks in Saudi Arabia, Malaysia and other foreign countries. "We could've easily said, 'GSM—that's the way you want to go, OK.'" But "it just wasn't the right decision for the North American market," where existing cellular networks would migrate to CDMA and full compatibility was essential. "It was not obvious to us that you were going to achieve that any time soon with some of the other air interfaces such as GSM.

"Our view was, building the network on the North American standards was absolutely the right choice," Erickson concludes.

Nortel, on the other hand, chose to present itself as the vendor able to accommodate any carrier's business plan, regardless of technology decision. "Because of the fact that we offer both, we can honestly sit down with operators and evaluate what's best for their needs and be able to do that sincerely," Buford says.

His semi-joking analogy: "If you ask McDonalds the answer to world hunger, they'll say it's Big Macs. But that's a biased answer."

Technology choice is a function of business plan, primarily whether the carrier plans to capture the roaming market, Buford claims. He admits that if Sprint had gone with GSM, "you would probably feel more comfortable" that there would be national GSM roaming agreements. But between Omnipoint in New York, Bell South and Pacific Bell, GSM has most of the two coasts covered, with the next round of auctions still to go. Lowenstein agrees that by the time all auctions are finished, every major market likely will have both CDMA and GSM providers.

SPRINT'S CHOICE

So will Sprint award a big chunk of its business to an AT&T business unit? "That's a funny political situation," says Goodstadt. "AT&T and Sprint are not exactly the best of friends."

But Network Systems may be another matter. In the past, Sprint has shown some "initial reluctance" to deal with AT&T, says Lowenstein, but AT&T Network Systems has done a good job of separating its business units.

"Most [customers] seem to have reached a comfort factor," says Lowenstein, noting that PrimeCo's RBOC owners are no chummier with AT&T than Sprint is.

Nortel's contracts with Canadian CDMA cellular carriers—who are seeking PCS licenses from their government—demonstrate its credibility as a CDMA vendor, Buford says. But winning a chunk of the estimated $1 billion-to-$2 billion Sprint contract sure would help eliminate any lingering doubt. ■

ADVANCED SERVICES

WILL THREE BE A CROWD?

General Instrument moves into SDV by acquiring a company that's at odds with its HFC partner.

Eric Krapf
Managing Editor

Strategic partnerships occasionally make strange bedfellows, but General Instrument's situation may be one of the strangest. Its partner in the Mediaspan HFC venture, DSC, was suing GI's switched digital video partner, Next Level Communications (NLC). What did GI do? It bought Next Level, giving it a whole new profile as a potential telco supplier but leaving questions about where the DSC partnership is headed.

Few of the principals will comment on the suit, in which DSC charges Next Level technology was developed while its chief founders worked for DSC and therefore belongs to DSC. Next Level contends the material in question was developed by Next Level.

"The NLC situation, we clearly have a different point of view than DSC, and we'll see how that plays out," says GI chief financial officer Charlie Dickson. Having acquired Next Level, "we're obviously going to be right in the middle of this thing."

Dickson says GI is comfortable with the position in which it finds itself. "We obviously took a very hard look in our due diligence at the issue of intellectual property" before going through with the acquisition, he says.

Next Level co-founder and CEO Tom Eames declined to comment on the suit, as did DSC spokesman Terry Adams.

GI already had taken a 10% stake in Next Level in February. Now, for $85 million and whatever legal headaches lie ahead, GI gets a company whose SDV platform aims at telcos looking to upgrade their networks but offer new services

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incrementally. The motto: "Telephony first, broadband ready."

The approach already has proved attractive, according to Dickson, who says RBOCs have responded favorably to demonstrations of the system. "The beauty of what Next Level offers us is it is an investment that the phone company would already make," he says.

Eames concedes, however, that the "telephony first" focus represented a confrontation with market realities. "We began the company with our eye focused on the broadband aspect," he says. "As time went by and we talked to the customers, it became apparent: 'Don't bother doing broadband unless you can do the telephony as well as we do it today.'

"We always knew we had to do that," Eames concludes, "but it caused us to go back" and refocus.

The system, called NLevel3, provides fiber to nodes serving eight homes for the same cost as other systems with larger nodes, according to Eames. It's more economical for carriers because new services are implemented at the customer premises, not in the network, he says.

"It pushes the cost toward that CPE so you [the carrier] don't have to pay for it till you need it," Eames says. The alternative—building the network to accommodate any possible service without knowing which will be in demand where—means higher costs, he maintains.

THE NLC SITUATION, WE CLEARLY HAVE A DIFFERENT POINT OF VIEW THAN DSC.

The platform provides greater efficiencies not only in network construction but in service provisioning, according to Eames. With the normal network model for advanced services, the provider must send a technician to the cabinet to enable the service, then to the customer premises to verify it works. Eames says Next Level's system brings advanced-service provisioning closer to a cable TV model, in which the customer can pick up the enabling CPE at the provider's office or buy it at an electronics store. The provider only has to send out a technician if the customer has a problem with installation. "If it works, there's no truck roll," Eames says.

Dickson expects trials of the Next Level system in second quarter 1996. Rollouts would be sometime later that year; Eames says the goal is to be in "some kind of a limited situation in the second half of '96," with broader deployment in 1997.

GI's interest in an SDV platform might seem like another big player deciding that hybrid fiber/coax (HFC) is being supplanted as telcos' architecture of choice. Dickson insists it's not that simple, that GI wants an offering for both: SDV to some

continued on page **64**

Circle 142

GENERAL INSTRUMENT

continued from page ***63***

telcos, HFC to other telcos and the cable companies, to "provide multiple platforms and architectures to meet the needs of the customer." He also notes the Next Level acquisition gives GI a shot at the $2 billion local loop equipment market.

But GI had been relying on DSC's Mediaspan as its HFC platform. Adams won't comment on how the Next Level acquisition will affect the GI-DSC partnership. But he notes DSC offers a full range of advanced-services platforms, including SDV, HFC and asymmetrical digital subscriber line (ADSL).

Has Next Level come between GI and DSC? Will the partners become enemies? As markets converge and new services emerge, it often seems like the industry has entered another world. With the GI-DSC-Next Level imbroglio, it may seem more like "Another World." ■

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DSC VS. DGI

INJUNCTION JUNCTION

Both sides in DSC's lawsuit against aftermarket competitor DGI say a Dallas federal district judge's ruling vindicates them, but the case is far from over.

Judge Joe Kendall granted a preliminary injunction against DGI, using tough words in his finding that the company infringed on DSC copyright of operating system software for a microprocessor card. But Kendall denied DSC's request for an injunction against DGI "reverse engineering" of the firmware residing on the card, finding DGI firmware wasn't substantially similar to DSC's and that DGI's firmware production was considered "fair use."

As far as DGI president and chief operating officer Lyle Coffman is concerned, Kendall's denial of the injunction on firmware is all his company needs to stay in the business of selling cards for DSC switching products. He also says the ruling was a victory for the practice of reverse engineering in telecommunication products.

"What we're doing today is what everybody and his brother has done to come up with a clone PC," says Coffman.

The ruling on the operating system was not a serious blow to DGI, according to Coffman. "We really don't use the operating system in our products," he maintains. "We're not interested in ever developing operating system software."

DSC spokesperson Terry Adams takes issue with Coffman's conclusion. Saying DSC is "very pleased with the court's conclusion," Adams notes software's importance in switching equipment and says of the two issues, the software was more important to DSC than the firmware.

He also points to Kendall's conclusions about how DGI came into possession of the DSC software. Kendall found DGI downloaded the software from DSC equipment belonging to DGI customer NTS Communications (without NTS's knowledge). The judge also found DGI didn't inquire as to whether the software was protected by a licensing agreement: "The court finds that they did not care."

Kendall went on to find "if they [DGI] asked permission (of either DSC or NTS) to access or copy the software, they would be told 'no.'" Furthermore, the judge found DGI "simply took the software without DSC's or NTS's knowledge or consent in their desperate effort to stay afloat and to compete."

Coffman maintains DGI got a copy of the software "accidentally" and returned it months before the injunction was entered. He says DGI isn't "desperate" and in fact has "zero debt." Coffman says DGI simply was arguing it would be in financial trouble if it couldn't continue producing its cards.

As it stands, Coffman says DGI can continue making and selling its products, for which he sees a $250 million market, ranging from $4000 cards to $250,000 frames, "and a lot of them are needed."

The case is set to go to trial next March, with DGI counter-litigation against DSC also pending. Adams says DSC's suit is about protecting intellectual property, which is "the lifeblood of any company, particularly in the technology area.

"We need to ensure that intellectual property remains with its rightful owners," Adams says.

To Coffman, the suit is about giant DSC wanting to stop a small competitor. He draws the David-and-Goliath analogy and comes across as a happy warrior who can't wait for the battle to be joined.

"It's going to be fun in March," Coffman says. ■

—Eric Krapf, managing editor

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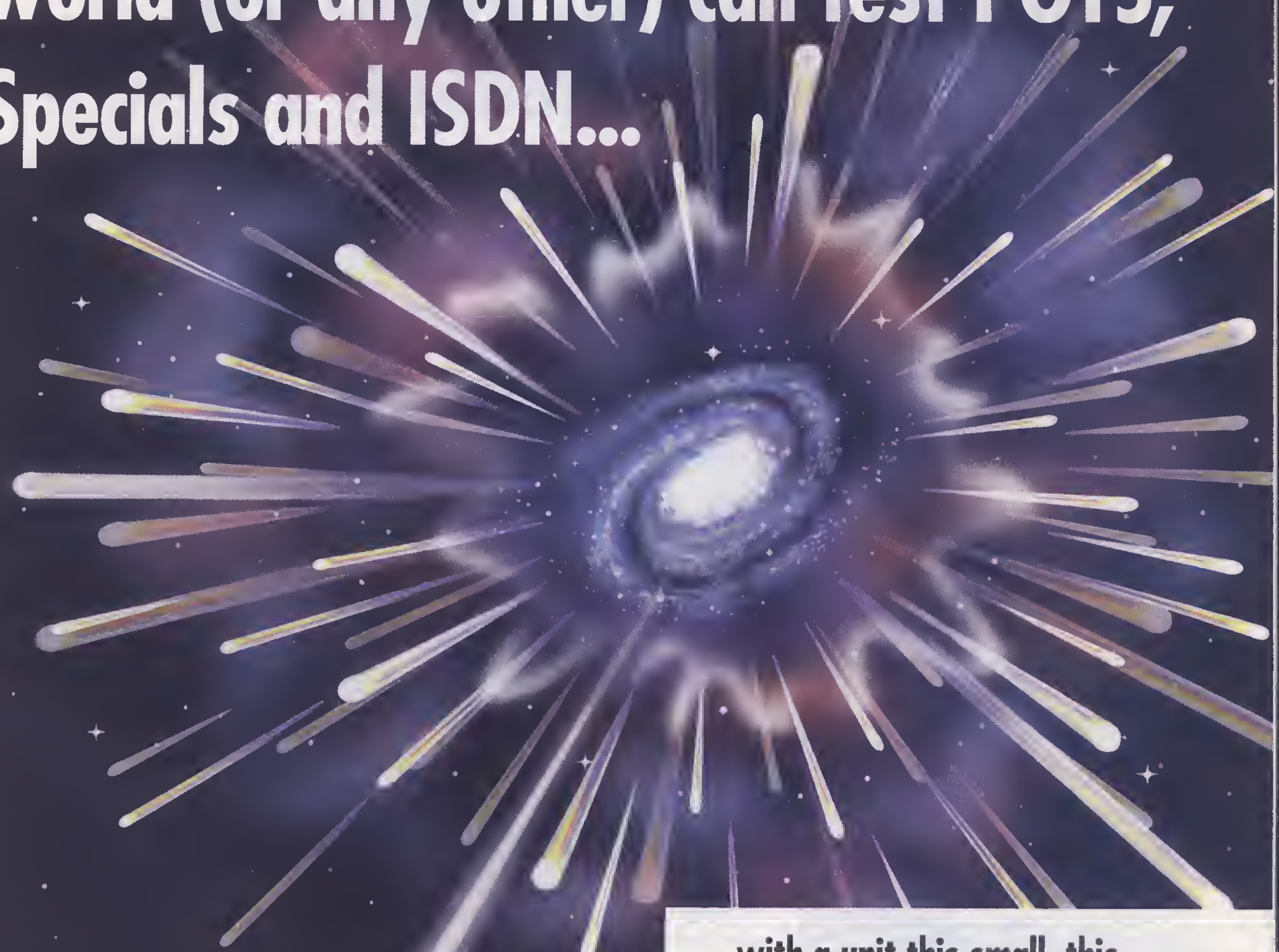

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Vince Vittore
Associate Editor

A host of vendors is rolling out new or next-generation ATM products including the largest ATM switch yet introduced.

Fujitsu Network Switching unveiled its third-generation ATM switch. The Fetex-150 ESP B160, available in early 1996, can be fully configured to 160 Gbps, making it the largest-capacity ATM switch on the market.

THIRD GENERATION - Fujitsu Network Switching has introduced a 160 Gbps ATM switch, the largest capacity on the market.

For those with smaller capacity requirements, the switch can be configured for as little as 2.5 Gbps.

"We're in active discussions with our customers. And our customers are showing there is a demand for this and bigger ones," says Rebecca Horn, Fujitsu vice president-marketing. "We believe the current applications have proven there's a demand for ATM services."

One of Fujitsu's most important customers thus far has been the North Carolina Information Highway, which deployed 12 ATM switches last year for various applications including distance learning and video arraignment of prisoners. Some locations already have exhausted capacity and are seeking more, Horn adds.

Aside from the capacity, Fujitsu is touting the switch's ability to handle switched virtual connections and permanent virtual connections on point-to-point and point-to-multipoint basis. It accommodates all four flavors of ATM: constant bit rate, variable bit rate, unspecified bit rate and available bit rate.

The company also introduced the newest member of its SMX family of ATM multiplexers. The SMX-6200 can aggregate as many as six different services within a facility and convert them into ATM cells for transmission. The company is highlighting the multiplexer's ability to combine data and video over the same link. To handle video, Fujitsu inserted a video card in place of external codecs, giving users a less expensive, higher quality signal.

The company expects to bundle the new switch and multiplexer with an alliance partner in the near future to produce an end-to-end ATM solution.

On the heels of Fujitsu's announcement, General DataComm (GDC) unveiled its own alliance, signing a reseller agreement with NetEdge. The agreement packages NetEdge's edge routers with GDC's Apex ATM switches, letting carriers offer native LAN interconnect data services.

Initially, the two companies will focus on markets requiring sophisticated central site computing centers, says Tim Smith, GDC director. "That means enterprise service providers or big businesses with a lot of telecommuters."

GDC believes the ATM market can be divided into four segments according to end users' capacity requirements. GDC is focusing on the middle markets—customers needing between 2 Gbps and 20 Gbps switching capacity. "The market at

continued on page ***68***

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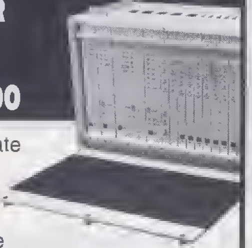

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ATM

continued from page ***66***

this point is dominated by carrier edge-type applications," Smith says.

Also, the company announced it has developed a lab to investigate multimedia applications running over an ATM network. The lab will focus on the numerous standards already in place and how they can be combined with emerging technologies.

"We are dealing with multiple dimensions and they all need to be dealt with differently," says Shaker Sabri, vice president and general manager of the multimedia research and development center. "We are not going to assume one standard is going to dominate."

One of the first applications it will examine is voice over ATM. "Over time, I think you can see voice climbing onto ATM networks," says Smith. "Voice really is driven by economics. The most cost-effective way to get it done is the way it will happen."

Though that's no great revelation, some companies already are moving on the thought. Premisys, a company already well versed in the data market, is jumping into the ATM voice market with a new ATM concentrator that adds legacy traffic to the mix.

The IMACS (Integrated Multiple Access Communications Server) ATM provides an input for non-ATM traffic such as PBXs, routers and narrowband video codecs. For voice traffic, the concentrator goes beyond circuit emulation, says Joe Miller, director-product marketing.

"This is the next step. It can grab analog voice ports off the user bus and map that to an ATM cell." In the product's next release it will support 40 kb, 32 kb and 24 kb voice compression, he adds.

Just as important, the product gives Premisys entry into the ATM market with what it believes may be the most important service of all.

"We're not proposing that voice is driving ATM deployment," Miller says. "But voice may be the killer app we're all hunting for." ■

WE'RE NOT PROPOSING THAT VOICE IS DRIVING ATM DEPLOYMENT. BUT VOICE MAY BE THE KILLER APP WE'RE ALL HUNTING FOR.

CONTRACT LOG

MCI has agreed to buy more than $300 million worth of switching and transmission products from **DSC**.

An MCI supplier since 1982, DSC will continue to provide tandem switching systems, intelligent network products and digital cross connects; additionally, MCI will have the option to purchase access broadband system products.

GTE Broadband Systems will provide ATM switching for a trial by **Rochester Telephone**. The company will supply its SPANet (Secure Prioritized ATM Network) central office switch and SNMP-compatible network manager, SPANview. The trial will enable applications including video conferencing, telemedicine, high-speed data and image transmission.

The New York State Independent Network Partnership (NYSINET) has selected **Tekelec**'s Eagle signal transfer point to host its new network infrastructure.

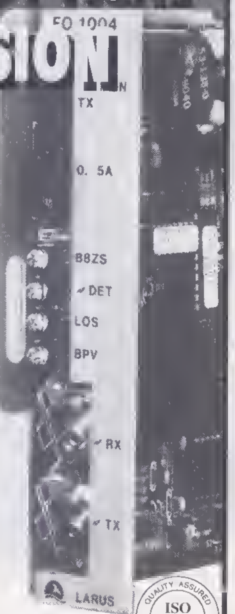
NYSINET is a consortium of 26 telcos serving more than 200,000 access lines, partnered to provide SS7 services.

Tekelec also is supplying systems integration, SS7 message generator/traffic simulator diagnostic equipment and interoperability assistance as part of the four-year contract.

Comsat RSI has won two state distance learning contracts totaling about $8 million. The Commonwealth of Virginia awarded Comast RSI a three-year contract, and the state of Florida awarded a program to install satellite downlinks for its Department of Corrections.

The Virginia network features digital uplinks at Old Dominion University, the University of Virginia and Virginia Polytechnic Institute, with downlinks throughout the state and U.S.

The Florida network includes 35 downlinks at state Department of Corrections facilities. ■



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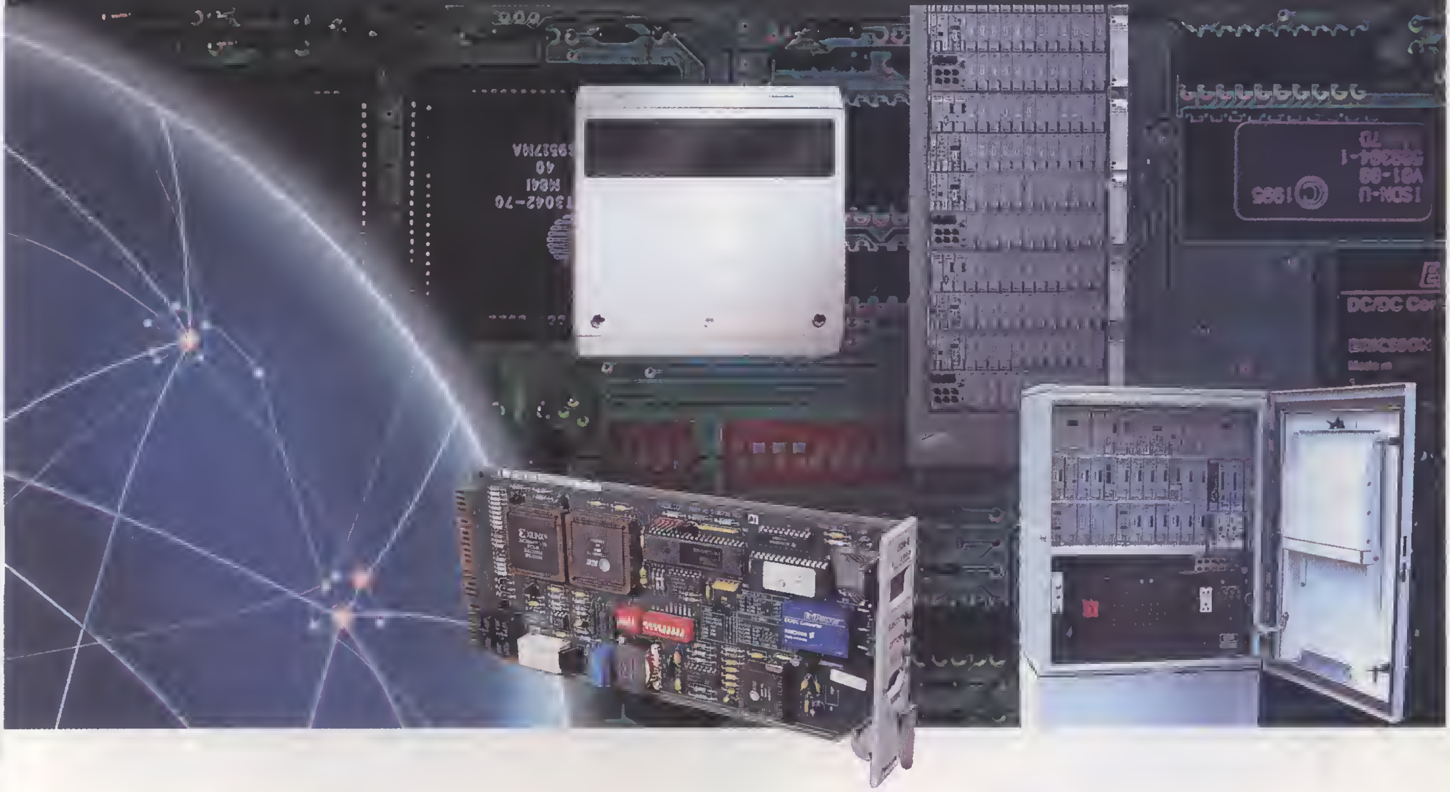

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	Oct. 2-4	Wisconsin State Telephone Association Fall Conference	Stevens Point WI	Holiday Inn	608-833-8866
	Oct. 3-4	Intro to Telecom: Voice & Data	Irving TX	Doubletree Guest Suites	800-227-1234
	Oct. 3-5	PC Expo exhibition and conference	Chicago IL	McCormick Place East	800-829-2281
	Oct. 3-6	Hands on HGH Performance Cable	Irving TX	Doubletree Guest Suites	800-227-1234
▼	Oct. 3-11	TELECOM 95	Geneva, Switzerland	Palexpo /USA Pavilion	+41 (22) 730-5811
	Oct. 7-14	Colombia TelExpo & CompuExpo '95	Bogota, Colombia	Corferias Fairgrounds	703-527-8000
	Oct. 8-11	Forum 95: Tradewinds, Charting a Course for Residential Technologies	Palm Beach FL	The Breakers Hotel	800-727-5711
	Oct. 10-11	ATM Technology & Applications	New York NY	Macklowe Hotel/Conference Center	800-227-1234
	Oct. 10-12	Atlantic Cable Show	Atlantic City NJ	Convention Center	609-848-1000
	Oct. 10-12	Consumer Electronics Show (CES) Mexico	Mexico City, Mexico	Palacio De Los Deportes	703-907-7600
	Oct. 10-12	Mid-American Cable Show	Overland Park KS	Overland Park Marriott/Trade Center	913-841-9241
	Oct. 11-12	Bar Code Solutions and Strategies Seminar	Detroit MI	Airport Hilton Suites	800-733-7592
	Oct. 15-18	National Communications Forum (NCF95)	Rosemont IL	Hyatt Regency O'Hare	312-938-3500
	Oct. 15-19	Electronic Industries Association annual conference	Scottsdale AZ	The Phoenician Hotel	703-907-7500
	Oct. 16-18	18th Annual Conference on Fiberoptics Markets	Newport RI	Newport Marriott	401-849-6771
	Oct. 16-20	Carolina-Virginias Telephone Membership Assn. Fall Meeting	Asheville NC	Grove Park Inn and Country Club	202-298-2328
	Oct. 17-18	Fundamentals Video/Multimedia	Chicago IL	The Drake Hotel	800-227-1234
	Oct. 18-20	International Wireless Communications Expo (IWCE)	Tampa FL	Convention Center	800-828-0420
	Oct. 22-24	Mid America Telecom Showcase and Seminar	Kansas City MO	Hyatt Regency	913-234-0307
	Oct. 23-24	Wireless Data Networks	Chicago IL	Tremont Hotel	312-540-3856
	Oct. 23-24	Wireless Business Telephone Systems Seminar	Minneapolis MN	Minneapolis Marriott	602-948-8225
▼	Oct. 23-25	Midwest Regional Telecommunications Expo (IN, OH, MI)	Fort Wayne IN	Grand Wayne Center	317-635-1272
	Oct. 23-25	Emerging Broadband Technology	Chicago IL	The Drake Hotel	800-227-1234
	Oct. 23-25	CMA '95: Communications Managers Association Conference	New York NY	New York Hilton	609-384-6287
	Oct. 24-25	Tele-Solutions EAST	St. John NB	St. John Trade and Convention Center	800-267-4529
	Oct. 25-27	TeleConferencing Users Conference	Anaheim CA	Anaheim Convention Center	405-743-0320
	Oct. 29-Nov. 1	Intelec '95	The Hague, Netherlands	Congress Center	908-221-0013
	Oct. 30	ITS International Monitor Awards	New York NY	Lincoln Center	212-877-5560
	Oct. 30-Nov. 1	Re-engineering the Telecom Back Office	Washington D.C.	Vista Hotel	800-822-6338
	Oct. 30-Nov. 2	The Third Biennial International Regulators Workshop	New York NY	Columbia University	212-854-4222
	Oct. 31-Nov. 1	Wireless Data II (CTIA Fall Conference & Expo)	Las Vegas NV	Mirage Hotel	202-785-0081
	Oct. 31-Nov. 3	Hands on HGH Performance Cable	San Francisco CA	Grosvenor Hotel	800-227-1234
▼	Nov. 1-3	ALTS Conference and Exposition	Palm Springs CA	Westin Mission Hills Resort	202-466-2581
	Nov. 1-3	UNICOM '95	Washington D.C.	Convention Center	202-296-9800
	Nov. 2-3	ID Info: San Jose	San Jose CA	Le Baron Hotel	800-331-5706
	Nov. 2-3	Fifth Annual North American Telecom Investment Opportunities Conference	Pebble Beach CA	Lodge at Pebble Beach	800-255-2099
	Nov. 5-7	Cooperative Strategies and Solutions: Building a National Info-Structure	Alexandria VA	Radisson Mark Plaza Hotel	800-669-4826
▼	Nov. 5-8	USTA National Conference	Orlando FL	Marriott/Hilton	202-326-7279
	Nov. 6-8	Iowa Telephone Association	Des Moines IA	Crystal Inn	202-298-2328
	Nov. 6-9	Next Generation Networks Annual Conference	Washington D.C.	Crystal Gateway Marriott	800-227-1234
	Nov. 8-9	North Dakota Telephone Association Fall Conference	Minot ND	Sheraton Riverside Inn	202-298-2328
	Nov. 8-10	Interactive Entertainment	Washington D.C.	Sheraton Carlton	800-822-6338
	Nov. 11-13	NIUF (ISDN) Fall Meeting	Gaithersburg MD	National Institute of Standards & Technlogy	301-975-2937
	Nov. 12-15	American Telemarketing Association Convention	Hilton Head SC	Hyatt Regency	213-463-2330
	Nov. 13-16	CMA Telecom	New York NY	New York Hilton and Towers	800-262-3976
	Nov. 13-16	44th International Wire & Cable Symposium	Philadelphia PA	Philadelphia Marriott	908-389-0990
	Nov. 13-17	COMDEX Fall '95	Las Vegas NV	Convention Center	617-449-6600
	Nov. 13-16	NARUC Annual Convention	New Orleans LA	N/A	202-898-2200
	Nov. 14-15	Bar Code Solutions and Strategies Seminar	Dallas TX	Arlington Hilton	800-733-7592
	Nov. 16-17	Video Dialtone Summit	Washington D.C.	ANA Hotel	202-408-0008
	Dec. 4-6	Implementing Local Exchange Competition	Washington D.C.	Marriott Metro Center	800-822-6338
	Dec. 4-6	North Dakota Association of Telephone Cooperatives Annual Meeting	Bismarck ND	Radisson Inn	202-298-2328
	Dec. 4-8	SUPERCOMPUTING '95	San Diego CA	Convention Center	619-534-5039
	Dec. 6-8	Multimedia ComForum and TecForums	Bal Harbour FL	Sheraton Bal Harbour	312-938-3500
	Dec. 12-13	Bar Code Solutions and Strategies Seminar	Chicago IL	Ramada O'Hare	800-733-7592

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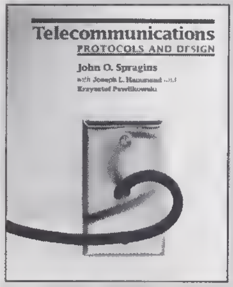

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CARRIER TALK

IN DEREGULATED ENVIRONMENT, EXPECT THE UNEXPECTED

Michael J. Friduss, Contributing Editor

As we head into the last quarter of 1995, it appears a telecom bill finally may emerge from Congress. As it stands, the Clinton administration, with support from the interexchange carriers, has threatened to veto the bill as anticompetitive, claiming it allows the RBOCs into long distance services before ensuring full and fair competition in local services. Whatever compromise is worked out by the House/Senate conference committee, and whenever it is signed into law, our world of markets segmented by law pretty much will have melted away.

Some immediate ramifications are obvious and already have generated a great deal of speculation:

- Today we generally refer to at least five major industry segments: LECs (RBOCs and Independents), IXCs, CAPs, wireless companies and cable companies. Tomorrow, through merger, acquisition or market expansion, major companies in each segment will be described as information companies that offer products from some or all of the "old" segments.
- Customers will be able to buy most or all of their information services from one company. The first major battle will be waged between IXCs and LECs for packaged local and long distance services.
- Competition to be the company of choice will be fierce.
- Two or three major players will emerge in each market.

Customer Expectations

Fast access to the service provider, real-time provisioning, near 100% reliability and cycle times approaching zero may make a significant market-share difference in the marketplace.

WHAT ELSE CAN WE EXPECT?

Recent market surveys tell us that large numbers of customers will choose to buy packaged products from one company. Both local and long distance market shares likely will shift quickly and dramatically. As other services become available from those companies, customers will add them to their packaged preferences.

Price competition likely will be hot and heavy for several years. Competitive edges will come from perceived differences in the product, including cycle times and reliability, packaging (including easy-to-read, user-friendly bills) and promotion.

Initial distrust will exist between potential "partners" in provisioning end-to-end service. Companies will want to take full advantage of their entrenched positions, reluctant to help potential competitors. They will try to force competitors to build expanded networks from scratch.

Two realities likely will change this mind set: First, the emergence of economically rational decisions—a recognition that shareholders will benefit from maximizing use of existing plant, even through wholesaling to a competitor. The second will be a recognition that national interests will not be well served by pouring capital into underused overlay networks. As a result, LECs, IXCs and others will retail and wholesale products to one another in a way that benefits everyone, including the customer.

It would not be too farfetched to envision LECs and even IXCs spinning off their physical networks. These spinoffs would be free to wholesale network products to any company, who in turn would package these products into information services retailed to customers by the surviving marketing companies.

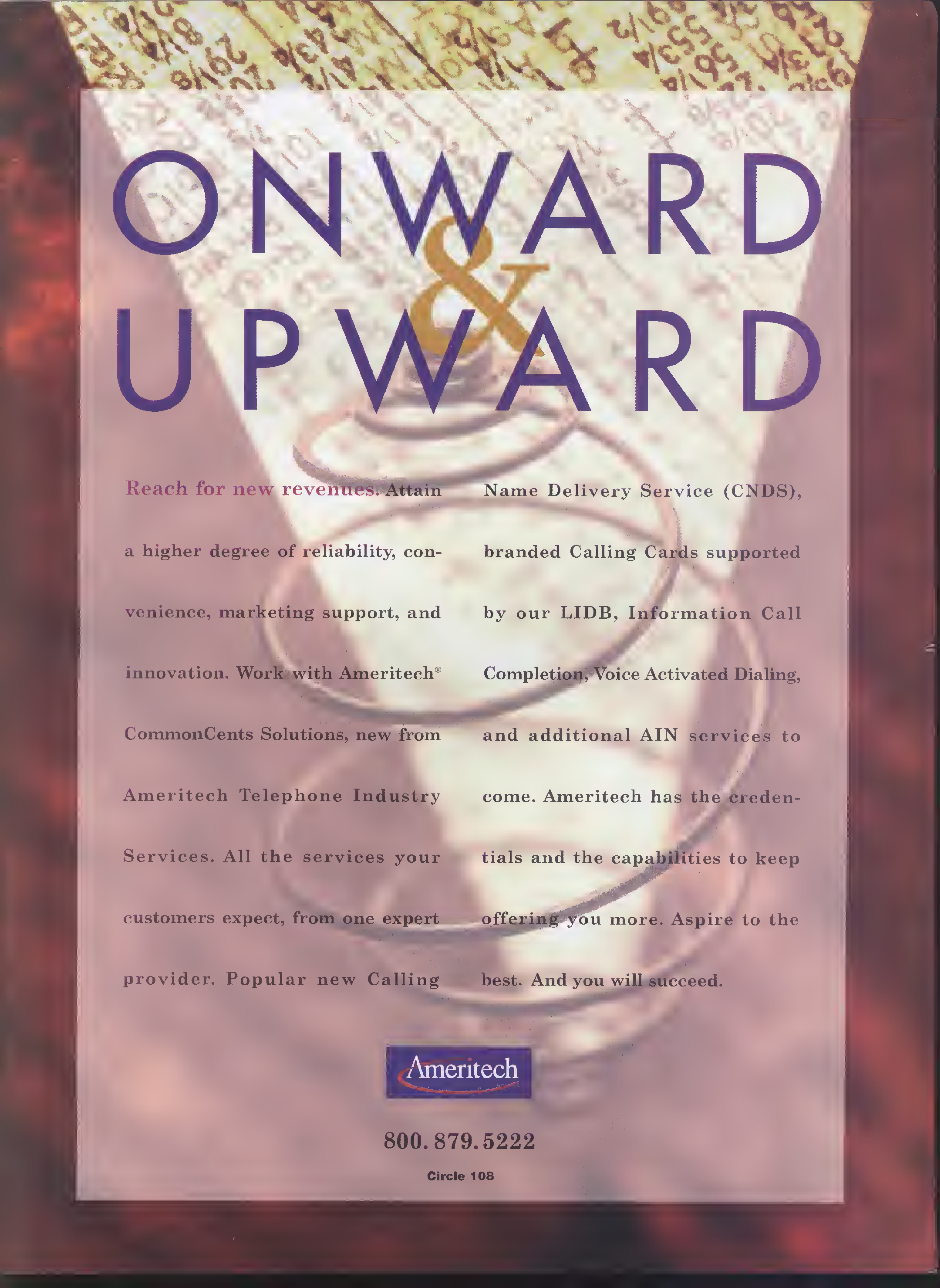
As packaged information and services become commonplace, distance will become less of a factor in pricing. Sprint's current offer of 10 cents a minute for calls anywhere in the U.S. is the first move in this direction. Longer term, across the street will be priced the same as across the country—or around the globe. Billing will be based on the value of the service offered, i.e., how much bandwidth is used and for how long.

Transport technology, from communications device to communications device, will become transparent to customers. Customers will order fixed or mobile service according to their needs and will not know or care whether the transport medium is wireless or landline.

Customer expectation of reliability and cycle times will rise significantly as competition for packaged services heats up. Fast access to the service provider, real-time provisioning, near 100% reliability and cycle times approaching zero may make a significant market-share difference in the marketplace.

Tumultuous times to be sure. You'd be hard pressed to find a more exciting industry to be a part of over the next few years. There will be winners and losers, with articles and entire books devoted to predicting which companies and which leaders will fall into either category. I take it all with a grain of salt. The game is just beginning, and over the next few years, we'll see who's truly focused on the customer, who really has shareholders' best interests at heart, and who's prepared for the unexpected. ■

Michael J. Friduss is president of M.J. Friduss & Associates consultancy in Highland Park, Ill.



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